

East

Ref #	Hits	Search Query	Dbs	Default Operator	Plurals	Time Stamp
S1	213	server\$1 same kvm	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/23 07:45
S2	1	networked adj2 kvm	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/23 07:47
S3	20	network\$3 adj3 kvm	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/23 07:47
S4	18	("20030051021"   "20040073712"   "20040098532"   "5483250"   "5669015"   "5875293"   "5946469"   "6112264"   "6256014"   "6378009"   "6539418"   "6557170"   "6567869"   "6609034"   "6671736"   "6672896"   "6681250"   "6718415").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2005/08/23 07:50
S5	9	("5721842"   "5732212"   "5740246"   "5884096"   "5917552"   "6041182"   "6070253"   "6112264"   "6304895").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2005/08/23 08:04
S6	0	("2005/0066106").URPN.	USPAT	OR	OFF	2005/08/23 08:14
S7	0	("2002/0143996").URPN.	USPAT	OR	OFF	2005/08/23 08:34
S8	88	rack with connect\$4 with manag\$3	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/23 09:04
S9	1311	rcm	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/23 09:04
S10	1	S9 same kvm	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/23 09:05

S11	7188	(709/203,226).CCLS.	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/23 09:06
S12	22	S11 and kvm	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/23 09:18
S13	1793	(345/168).CCLS.	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/23 09:18
S14	5	S13 and kvm	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/23 09:27
S15	7748	(710/62-65,72-73,16-19,36-38,48, 300,305,313-317,260).CCLS.	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/23 09:27
S16	39	S15 and kvm	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/23 09:28
S17	4	("5813014"   "6665179"   "6762932"   "6807056").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2005/08/23 09:29
S19	216	ipml	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/23 09:55
S21	133	ipml and (intelligent adj platform)	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/26 07:12
S22	32	avocent.as.	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/23 10:10

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S23	13	raritan.as.	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/23 10:12
S24	7	ccc with network\$1.as.	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/23 10:49
S25	275	belkin.as.	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/23 10:49
S26	1	S25 and kvm	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/23 11:09
S27	12	kvm with distributed	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/23 11:12
S28	0	(press\$2 with button with server) same kvm	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/23 13:20
S29	3	minicom.as.	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/23 13:20
S30	19	embedded with kvm	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/23 14:38
S31	0	(control adj module) same kvm	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/23 14:39
S32	21	(control adj module) and kvm	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/23 15:12

S33	0	3up.as.	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/23 15:13
S34	0	kvm same fascia	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/23 15:13
S35	135	button same fascia	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/23 15:13
S36	2	S35 same keyboard	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/23 15:14
S37	0	"button select" same (blade server) same fascia	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/23 15:14
S38	0	"button select" same (blade server) same bezel	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/23 15:26
S39	5	kvm adj request\$3	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/23 15:39
S40	3	cubix.as.	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/24 06:00

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S41	50	("6681250" "5267235" "4993017" "5764895" "5857075" "6012099" "6122667" "5721842" "5734918" "5815652" "5905781" "5907548" "5937176" "5943408" "6014431" "6035261" "6044476" "6112264" "6157843" "6169897" "6199180" "6240533" "6333932" "6338140" "6614782" "6388658" "6880002" "6615272" "5315594" "5506988" "5794031" "6061334" "6088439" "6185626" "5289368" "5325292" "5396552" "5875300" "5884096" "6031743" "6070186" "6073015" "6097948" "6243357" "6339593" "6411620" "6631140" "6658253" "5463623" "5623495"),pn.	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	OR	OFF	2005/08/24 06:00
S42	17	rb.as. and server	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/24 09:49
S43	5	automatic with kvm	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/24 09:58
S44	5	automatic same kvm	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/24 09:58
S45	31	automatic\$4 same kvm	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/24 10:01
S46	25386	intel.as.	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/24 10:02
S47	14	S46 and (blade adj server)	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/24 10:04
S48	17	S46 and (blade near2 server)	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/24 10:06

S49	1	S46 and blade and kvm	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/24 10:06
S50	2	S46 and kvm	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/24 10:06
S51	11	("20040199699") or ("20040098532") or ("20020143996") or ("6557170") or ("6681250"),pn.	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/24 10:14
S52	1	("2004/0098532"),URPN.	USPAT	OR	OFF	2005/08/24 10:14
S56	8	concentrat\$4 same kvm	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/24 10:47
S57	3	"k/v/m"	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/24 11:13
S58	635	kvm	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/24 11:19
S59	24	S58 and "361".das.	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/24 11:13
S60	55	S58 and ("server blade" "blade server")	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/24 11:19
S61	6	1655mc	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/25 14:33
S62	0	ekvm	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/25 14:33

Fast

S63	8716	agilent.as.	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/25 14:33
S64	182	S63 and keyboard	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/25 14:56
S65	7	("1193317").PN.	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/25 14:55
S68	129	S63 and server	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/25 15:33
S69	0	S63 and (blade same server)	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/25 14:56
S70	32	S63 and (blade)	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/25 14:56
S72	8	("6578140") or ("20020124121") or ("20020143996") or ("6915362").PN.	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/25 15:45
S74	39	("5974489")["6157534"]["6351786"] ["6425009"]["6427185"]["6434703"] ["6577631"]["6587461"]["6611853"] ).PN"	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/26 06:29
S75	1	2005-353026.NRAN.	DERWENT	OR	OFF	2005/08/26 07:11
S77	56	kvm with ip	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/26 07:55
S78	5	\$2kvm not kvm	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/26 07:56

S79	29	(US-20020038334-\$ or US-20020124121-\$ or US-20020143996-\$ or US-20030051021-\$ or US-20030131127-\$ or US-20030222801-\$ or US-20040073712-\$ or US-20040098532-\$ or US-20040199699-\$ or US-20040215617-\$ or US-2005004184-\$ or US-20050050272-\$ or US-20050066108-\$ or US-20050066106-\$).dld. or (US-5721842-\$ or US-5884096-\$ or US-6304895-\$ or US-6378009-\$ or US-6567869-\$ or US-6578140-\$ or US-6654241-\$ or US-6681250-\$ or US-6701380-\$ or US-6718415-\$ or US-6915362-\$ or US-6931475-\$).dld. or (US-20020143996-\$ or US-20040215617-\$ or TW-224273-\$).dld.	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/26 11:28
S80	5	S79 and I2C	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/26 11:28

Set	Items	Description
S1	333	KVM OR (KEYBOARD? OR KEY()BOARD?) (2W) (VIDEO? OR MONITOR? OR CRT) (2W)MOUSE?
S2	1492988	SWITCH? OR MODULE? OR BUTTON? OR CONTROLMODULE? OR PUSHBUTTON? OR PRESSBUTTON? OR PUSHSWITCH? OR PRESSSWITCH? OR DIAL? - OR KNOB? ? OR SELECTOR? OR SELECTER? OR SELECTING? OR SHIFTER? OR TOGGLE? ?
S3	133519	CONTROLKNOB? OR PUSHKNOB? OR PRESSKNOB? OR ACTUATOR? OR ACTUATER? OR PUSHACTUAT? OR PRESSACTUAT? OR ACTUATING?
S4	1596366	INTERRUPT? OR ONOFF? OR ON()OFF OR NOGO OR NO()GO OR ABORT? OR TERMINAT? OR SHUTOFF? OR SHUT?()OFF OR POWEROFF? OR POWER-?()OFF OR PULSE? OR DISABL? OR DEACTIVAT? OR DE()ACTIVAT?
S5	245326	HALT? OR ARREST? OR CEASE? OR CEASING? OR CESSAT? OR DESIST?
S6	6228397	EQUIVAL? OR PER OR PAIRED OR EACH OR DEDICATED? OR OWN OR - INDIVIDUAL? OR VERYSAME?
S7	11363373	SEPARATE? OR DIFFERENT? OR SPECIFIC? OR DISTINCT? OR COMPLEMENTAR?
S8	1754390	CORRESPONDING? OR MATCHING? OR COUNTERPART? OR DESIGNAT? OR "SAME"() (AMOUNT? OR NUMBER?)
S9	975741	BLADE? OR BOARD? OR PCB OR PCBS OR MOTHERBOARD? OR DAUGHTERBOARD? OR SERVERBLAD? OR SERVERBOARD? OR COMPUTERBOARD? OR COMPUTERBLAD? OR RACK? OR TRAY? OR SLIDEIN? OR SLIDE() (IN OR INS) OR CARD OR CARDS OR PANEL? ?
S10	174985	LOCAL(2N)NETWORK? OR LAN OR LANS OR ETHERNET? OR INTRANET?
S11	5285225	PLURAL? OR MULTIP? OR MULTIT? OR SEVERAL? OR NUMEROUS?
S12	4879712	SERVER? OR CPU OR COMPUTER? OR WORKSTATION? OR WORK()STATION? OR (DATA OR CENTRAL OR MICRO)()PROCESSOR? OR PROCESSOR?
S13	183699	DATAPROCESSOR? OR MICROPROCESSOR? OR CENTRALPROCESSOR? OR - CPUS OR MAINFRAME?
S14	0	CUBIX?(20N)(XP4 OR XL4) OR CUBIXXP4 OR CUBIXXL4
S15	0	INTEL?(20N)(SBCE? OR SBXL? OR SBXL52? OR SBCECMM? OR SERVER?()MANAG?()MODUL?)
S16	116	S1(10N)S2:S5
S17	96	S16 AND S9:S13
S18	9	S16 AND S6:S8
S19	9	S17 AND S18
S20	9	S18:S19
S21	8	S20 AND PY<2004
S22	8	RD (unique items)
S23	68	S17 AND PY<2004
S24	66	RD (unique items)
S25	30	S24 AND S2:S5(10N)(S6:S9 OR S12:S13)
File	2:INSPEC	1969-2005/Aug W2 (c) 2005 Institution of Electrical Engineers
File	6:NTIS	1964-2005/Aug W2 (c) 2005 NTIS, Intl Cpyrght All Rights Res
File	8:Ei Compendex(R)	1970-2005/Aug W2 (c) 2005 Elsevier Eng. Info. Inc.
File	34:SciSearch(R)	Cited Ref Sci 1990-2005/Aug W2 (c) 2005 Inst for Sci Info
File	35:Dissertation Abs Online	1861-2005/Jul (c) 2005 ProQuest Info&Learning
File	65:Inside Conferences	1993-2005/Aug W3 (c) 2005 BLDSC all rts. reserv.
File	94:JICST-EPlus	1985-2005/Jul W1 (c)2005 Japan Science and Tech Corp(JST)
File	99:Wilson Appl. Sci & Tech Abs	1983-2005/Jul (c) 2005 The HW Wilson Co.
File	111:TGG Natl.Newspaper Index(SM)	1979-2005/Aug 24 (c) 2005 The Gale Group

File 144:Pascal 1973-2005/Aug W2  
    (c) 2005 INIST/CNRS  
File 239:Mathsci 1940-2005/Oct  
    (c) 2005 American Mathematical Society  
File 256:TecInfoSource 82-2005/Aug  
    (c) 2005 Info.Sources Inc

22/3,K/4 (Item 1 from file: 256)  
DIALOG(R)File 256:TecInfoSource  
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00147341 DOCUMENT TYPE: Review

PRODUCT NAMES: PowerEdge 1655MC (180752); HP ProLiant BL20p G1 (144487);  
ServerBlade 1200i (108448)

TITLE: Pitching Blades : Server vendors are hyping a new form that  
offers...

AUTHOR: Drews, James E

SOURCE: Network Computing, v14 n11 p45(7) Jun 13, 2003

ISSN: 1046-4468

HOME PAGE: <http://www.NetworkComputing.com>

RECORD TYPE: Review

REVIEW TYPE: Product Comparison

GRADE: Product Comparison, No Rating

REVISION DATE: 20031030

...PRODUCT NAMES: 144487); ServerBlade 1200i...

TITLE: Pitching Blades : Server vendors are hyping a new form that  
offers.....

Dell Computer 's PowerEdge 1655MC, Hewlett-Packard's (HP's) HP ProLiant BL20pG1, and RLX Technologies' ServerBlade 1200i are among compared blade devices. The blade devices were evaluated with the Intel Iometer Database Test, the Intel Iometer Max I/O test, the NWC Custom Test, and the following features: height of blade chassis; blade processor ; maximum blades per unit; blades per 42U rack ; network adapters per blade ; maximum memory per blade ; maximum processors per blade ; maximum disks; RAID available for internal disks; Fiber Channel adapter; hot-swappable disks; built-in KVM ; console access; Graphical console redirection; network switch redundant power supplies; Linux support; USB ports; PCI slots; price for chassis; price for blade ; and price for management software. Only the HP ProLiant BL20pG1 provides PCI slots, and the ProLiantBL40p supports the most processors per blade (4). HP ProLiant BL10e supports the largest number of blades per unit (8) and also the largest number of blades per 42U rack . Testers found that managing blades is easy, and they found that only the Dell 1655MC provides each blade with a USB port. The RLX ServerBlade 1200i does not provide access to the console for video, but testers could do a workaround. The RLX management software is the only evaluated product to product trend graphs of multiple components.

COMPANY NAME: Dell Computer Corp...

DESCRIPTORS: Blade Servers ; Hardware Selection; Network Servers ;  
Network Software

1999

22/3,K/5 (Item 2 from file: 256)  
DIALOG(R)File 256:TecInfoSource  
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00140859 DOCUMENT TYPE: Review

PRODUCT NAMES: KVM Switches (801674

TITLE: Advancing the art of KVM switches : KVM via IP brings new ways to...

AUTHOR: Nance, Barry

SOURCE: Network World, v19 n33 p43(2) Aug 19, 2002

ISSN: 0887-7661

HOME PAGE: <http://www.nwfusion.com>

RECORD TYPE: Review

REVIEW TYPE: Product Comparison

GRADE: Product Comparison, No Rating

REVISION DATE: 20021130

PRODUCT NAMES: KVM Switches (

TITLE: Advancing the art of KVM switches : KVM via IP brings new ways to.....

Raritan Computer 's Paragon Matrix UMT442, Digital V6's Kaveman, Avocent's DSR 2161 and DSView Software...

...keyboard, video, and mouse or KVM via IP) products. The systems allow users to control **servers** from a longer distance than possible with analog KVM, which requires the devices to be within a few feet of **each** other, but KVM via IP stretches **server** control across the extent of the IP network or over the Internet. Access is over 10/100 **EtherNet** , and users can also use a **dial** -up connection or Web browser to control **servers** . **KVM** via IP boxes help monitor **server** health, are more scalable than analog KVM, provide multi-user access, and to some extent...

...network-based interaction-consolidation devices. All the devices tested provided dependable operation, excellent and responsive **server** control, and easy, fast installation. In the future, Bluetooth wireless technology will probably link **servers** to a nearby central unit, which would eliminate the cable chaos in many **server** farms.

DESCRIPTORS: Communications Interfaces; Hardware Selection;  
Internetworking; **LANs** ; Network Administration; Network **Servers** ;  
Network Software; Remote Control; WANs

1999

22/3,K/6 (Item 3 from file: 256)  
DIALOG(R)File 256:TecInfoSource  
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00140799 DOCUMENT TYPE: Review

PRODUCT NAMES: Paragon UMT 1664 (123633)

TITLE: A Paragon of Security, Raritan's System Provides Remote Access...  
AUTHOR: Anderson, Ron  
SOURCE: Network Computing, v13 n17 p30(2) Aug 19, 2002  
ISSN: 1046-4468  
HOMEPAGE: <http://www.NetworkComputing.com>

RECORD TYPE: Review  
REVIEW TYPE: Review  
GRADE: A

REVISION DATE: 20021130

Raritan **Computer** 's Paragon UMT 1664, a category 5 UTP cable-based, matrix switching unit, a 64...

...be tiered sufficiently to allow up to 64 users to control up to 10,000 **servers** , says the vendor. Rated excellent, the Paragon UMT 1664 and its TeleReach Web interface provide...

...the competition by providing many ports in a small place. The Paragon family of matrix- **switching keyboard , video , and mouse** components (KVMs) is installed between Raritan **computer** interface **modules** (CIMs) and the user stations (USTs). **Multiple** CIMs support various types of equipment, including PS/2 devices, ASCII/serial devices, Sun systems, and USB connections. As a multi-user device, it requires mediation of any **specific server** . Users have three choices for controlling contention for the same systems: private, public view, and...

COMPANY NAME: Raritan **Computer** Inc...  
DESCRIPTORS: Communications Interfaces; **Computer** Security; Network Administration; Network Software; Remote Control; Remote Network Access  
1999

22/3,K/7 (Item 4 from file: 256)  
DIALOG(R) File 256:TecInfoSource  
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00138824 DOCUMENT TYPE: Review

PRODUCT NAMES: Avocent DSR-2161 (107603)

TITLE: Server management for the Internet Age  
AUTHOR: Schultz, Keith  
SOURCE: Serverworld, v16 n3 p6(2) Mar 2002  
ISSN: 1091-4986  
HOMEPAGE: <http://www.serverworldmagazine.com>

RECORD TYPE: Review  
REVIEW TYPE: Review  
GRADE: A

REVISION DATE: 20030930

TITLE: Server management for the Internet Age

Avocent's Avocent DSR-2161 is a **keyboard / video / mouse ( KVM ) switch** that provides a way to control up to 16 **servers** or other keyboard- driven or monitor-driven pieces of hardware from a single 1U **rack** device. The device is built with existing Avocent technology, and provides local keyboard, video display, and mouse access to the **server** farm, in addition to TCP/IP-based KVM over IP, providing for remote access. Video...

...during the installation. The DSR-2161 provides both analog and digital access, and users can **switch** between a single **keyboard , monitor , and mouse** located at the **rack** . The combination of direct access at the switch and remote access is a major advantage. Another advantage is its use of standard Category-5 cabling to connect **each** port on the **KVM switch** to the **server** hardware. A smart cable connector accepts the cable at one end and provides a standard...

DESCRIPTORS: Communications Interfaces; **LANs** ; Network Administration;  
Network **Servers** ; Network Software  
1999

25/3,K/5 (Item 5 from file: 2)  
DIALOG(R)File 2:INSPEC  
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7436121

**Title: Remote control via IP links**

Author(s): Sturdevant, C.  
Journal: IT Week vol.5, no.33 p.16  
Publisher: VNU Business Publications,  
Publication Date: 9 Sept. 2002 Country of Publication: UK  
CODEN: IWTEAB ISSN: 1462-396X  
SICI: 1462-396X(20020909)5:33L:16:RCL;1-9  
Material Identity Number: K795-2002-018  
Language: English  
Subfile: D  
Copyright 2002, IEE

Abstract: Avocent's AutoView 2000R is a **switching** device for the **keyboard** , **video** and **mouse** ( **KVM** ) signals from Intel and Sun **computer** systems, and is designed for medium- sized organisations. The product comprises a 16-port, **rack** -mountable **KVM** **switch** that provides one analogue and two digital consoles. With **KVM** over IP, the digital consoles can be used from any browser-equipped **computer** that is connected to the Internet. It can control up to 16 systems, or 384...

Descriptors: inter- **computer** links...

...Identifiers: Intel **computer** systems...

...Sun **computer** systems...

...16-port **rack** -mountable **KVM** **switch** ;  
2002

25/3,K/6 (Item 6 from file: 2)

DIALOG(R)File 2:INSPEC

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6579552

**Title: Apex Outlook 180ES KVM switch has a new perspective**

Author(s): Stromski, J.R.

Author Affiliation: Syracuse Univ., NY, USA

Journal: Network Computing vol.11, no.5 p.32-3

Publisher: CMP Media Inc,

Publication Date: 20 March 2000 Country of Publication: USA

CODEN: NETCF7 ISSN: 1046-4468

SICI: 1046-4468(20000320)11:5L:32:AO1S;1-N

Material Identity Number: H327-2000-007

Language: English

Subfile: D

Copyright 2000, IEE

**Title: Apex Outlook 180ES KVM switch has a new perspective**

Abstract: The Outlook KVM ( keyboard / video / mouse ) switch system lets you monitor up to 256 servers from a single location in a tiered environment. It supports multiple platforms natively or in tandem with other Apex products. With OSCAR you can switch between servers and configure the device type, device names, scan times, scan order and other settings.

Descriptors: computer network management...

...network servers

...Identifiers: servers ; ...

...Apex Outlook 180ES KVM switch ;  
2000

25/3,K/13 (Item 4 from file: 111)  
DIALOG(R)File 111:TGG Natl.Newspaper Index(SM)  
(c) 2005 The Gale Group. All rts. reserv.

08174876 Supplier Number: 102708854  
**Minicom to Release Exciting New 16 Port Rackmountable CAT5 Switch with  
IP Access; Company to Release New Line of 8 Port, 16 Port and 16 IP KVM  
Switches .**  
Business Wire, 5006  
June 3, 2003  
LANGUAGE: English RECORD TYPE: Citation

**Minicom to Release Exciting New 16 Port Rackmountable CAT5 Switch with  
IP Access; Company to Release New Line of 8 Port, 16 Port and 16 IP KVM  
Switches .**

DESCRIPTORS: Computer software industry  
20030603

25/3,K/15 (Item 6 from file: 111)  
DIALOG(R)File 111:TGG Natl.Newspaper Index(SM)  
(c) 2005 The Gale Group. All rts. reserv.

07881860 Supplier Number: 87733113  
**Avocent Announces Powerful New AMX Analog KVM Switching System for  
Controlling Multiple Servers ; Industry Leader Raises Bar for Scalable  
KVM Switching and Server Control.**  
Business Wire, 2042  
June 25, 2002  
LANGUAGE: English RECORD TYPE: Citation

**Avocent Announces Powerful New AMX Analog KVM Switching System for  
Controlling Multiple Servers ; Industry Leader Raises Bar for Scalable  
KVM Switching and Server Control.**

DESCRIPTORS: Computer peripherals industry  
20020625

25/3,K/16 (Item 7 from file: 111)  
DIALOG(R)File 111:TGG Natl.Newspaper Index(SM)  
(c) 2005 The Gale Group. All rts. reserv.

07798223 Supplier Number: 91028069  
**AutoView1000R and 2000R KVM Switches Expand Control of Multiple  
Servers From Any Location.**  
Business Wire, 2036  
Sept 4, 2002  
LANGUAGE: English RECORD TYPE: Citation

**AutoView1000R and 2000R KVM Switches Expand Control of Multiple  
Servers From Any Location.**

DESCRIPTORS: Computer peripherals industry  
20020904

25/3,K/20 (Item 11 from file: 111)  
DIALOG(R)File 111:TGG Natl.Newspaper Index(SM)  
(c) 2005 The Gale Group. All rts. reserv.

06265808 Supplier Number: 61633968  
**Cybox Announces AutoView 400, Multi-Platform KVM Switch for Managing  
Multiple Servers from One Console.**  
Business Wire, 0293  
April 25, 2000  
LANGUAGE: English RECORD TYPE: Citation

**Cybox Announces AutoView 400, Multi-Platform KVM Switch for Managing  
Multiple Servers from One Console.**

COMPANY NAMES: Cybox **Computer** Products Corp.  
DESCRIPTORS: **Computer** peripherals industry...  
PRODUCT NAMES: 3573200 ( **Computer** Peripherals...  
SIC CODES (NAICS): 33411 **Computer** and Peripheral Equipment  
Manufacturing; 33421 Telephone Apparatus Manufacturing  
20000425

25/3,K/24 (Item 15 from file: 111)  
DIALOG(R)File 111:TGG Natl.Newspaper Index(SM)  
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05799547 Supplier Number: 54541334  
**Cybex Computer Products Corporation Unveils AutoView 200, Advanced Rack**  
**-Mountable KVM Switch for Data Centers.**  
Business Wire, 1312  
May 4, 1999  
LANGUAGE: English RECORD TYPE: Citation

**Cybex Computer Products Corporation Unveils AutoView 200, Advanced Rack**  
**-Mountable KVM Switch for Data Centers.**

COMPANY NAMES: Cybex **Computer** Products Corp.  
DESCRIPTORS: **Computer** peripherals industry  
PRODUCT NAMES: 3573200 ( **Computer** Peripherals)  
SIC CODES (NAICS): 33411 **Computer** and Peripheral Equipment  
Manufacturing  
19990504

25/3,K/26 (Item 1 from file: 256)  
DIALOG(R)File 256:TecInfoSource  
(c) 2005 Info.Sources Inc. All rts. reserv.

00140859 DOCUMENT TYPE: Review

PRODUCT NAMES: KVM Switches (801674

TITLE: Advancing the art of KVM switches : KVM via IP brings new ways to...

AUTHOR: Nance, Barry

SOURCE: Network World, v19 n33 p43(2) Aug 19, 2002

ISSN: 0887-7661

HOME PAGE: <http://www.nwfusion.com>

RECORD TYPE: Review

REVIEW TYPE: Product Comparison

GRADE: Product Comparison, No Rating

REVISION DATE: 20021130

PRODUCT NAMES: KVM Switches (

TITLE: Advancing the art of KVM switches : KVM via IP brings new ways to.....

Raritan Computer 's Paragon Matrix UMT442, Digital V6's Kaveman, Avocent's DSR 2161 and DSView Software...

...keyboard, video, and mouse or KVM via IP) products. The systems allow users to control **servers** from a longer distance than possible with analog KVM, which requires the devices to be within a few feet of each other, but KVM via IP stretches **server** control across the extent of the IP network or over the Internet. Access is over 10/100 **EtherNet** , and users can also use a **dial** -up connection or Web browser to control **servers** . KVM via IP boxes help monitor **server** health, are more scalable than analog KVM, provide multi-user access, and to some extent...

...network-based interaction-consolidation devices. All the devices tested provided dependable operation, excellent and responsive **server** control, and easy, fast installation. In the future, Bluetooth wireless technology will probably link **servers** to a nearby central unit, which would eliminate the cable chaos in many **server** farms.

DESCRIPTORS: Communications Interfaces; Hardware Selection;  
Internetworking; **LANs** ; Network Administration; Network **Servers** ;  
Network Software; Remote Control; WANs

1999

25/3,K/27 (Item 2 from file: 256)  
DIALOG(R)File 256:TecInfoSource  
(c) 2005 Info.Sources Inc. All rts. reserv.

00140799 DOCUMENT TYPE: Review

PRODUCT NAMES: Paragon UMT 1664 (123633)

TITLE: A Paragon of Security, Raritan's System Provides Remote Access...  
AUTHOR: Anderson, Ron  
SOURCE: Network Computing, v13 n17 p30(2) Aug 19, 2002  
ISSN: 1046-4468  
HOMEPAGE: <http://www.NetworkComputing.com>

RECORD TYPE: Review  
REVIEW TYPE: Review  
GRADE: A

REVISION DATE: 20021130

Raritan **Computer** 's Paragon UMT 1664, a category 5 UTP cable-based, matrix switching unit, a 64...

...be tiered sufficiently to allow up to 64 users to control up to 10,000 **servers** , says the vendor. Rated excellent, the Paragon UMT 1664 and its TeleReach Web interface provide...

...the competition by providing many ports in a small place. The Paragon family of matrix- **switching keyboard , video , and mouse** components (KVMs) is installed between Raritan **computer** interface **modules** (CIMs) and the user stations (USTs). **Multiple** CIMs support various types of equipment, including PS/2 devices, ASCII/serial devices, Sun systems, and USB connections. As a multi-user device, it requires mediation of any specific **server** . Users have three choices for controlling contention for the same systems: private, public view, and...

COMPANY NAME: Raritan **Computer** Inc...  
DESCRIPTORS: Communications Interfaces; **Computer** Security; Network Administration; Network Software; Remote Control; Remote Network Access  
1999

25/3,K/28 (Item 3 from file: 256)  
DIALOG(R)File 256:TecInfoSource  
(c) 2005 Info.Sources Inc. All rts. reserv.

00138824 DOCUMENT TYPE: Review

PRODUCT NAMES: Avocent DSR-2161 (107603)

TITLE: Server management for the Internet Age  
AUTHOR: Schultz, Keith  
SOURCE: Serverworld, v16 n3 p6(2) Mar 2002  
ISSN: 1091-4986  
HOMEPAGE: <http://www.serverworldmagazine.com>

RECORD TYPE: Review  
REVIEW TYPE: Review  
GRADE: A

REVISION DATE: 20030930

TITLE: Server management for the Internet Age

Avocent's Avocent DSR-2161 is a **keyboard / video / mouse ( KVM ) switch** that provides a way to control up to 16 **servers** or other keyboard- driven or monitor-driven pieces of hardware from a single 1U **rack** device. The device is built with existing Avocent technology, and provides local keyboard, video display, and mouse access to the **server** farm, in addition to TCP/IP-based KVM over IP, providing for remote access. Video...

...during the installation. The DSR-2161 provides both analog and digital access, and users can **switch** between a single **keyboard , monitor , and mouse** located at the **rack** . The combination of direct access at the **switch** and remote access is a major advantage. Another advantage is its use of standard Category-5 cabling to connect **each** port on the **KVM switch** to the **server** hardware. A smart cable connector accepts the cable at one end and provides a standard...

DESCRIPTORS: Communications Interfaces; **LANs** ; Network Administration;  
Network **Servers** ; Network Software  
1999

Set	Items	Description
S1	162	KVM OR (KEYBOARD? OR KEY()BOARD?) (2W) (VIDEO? OR MONITOR? OR CRT) (2W)MOUSE?
S2	1782112	SWITCH? OR MODULE? OR BUTTON? OR CONTROLMODULE? OR PUSHBUTTON? OR PRESSBUTTON? OR PUSHSWITCH? OR PRESSSWITCH? OR DIAL? - OR KNOB? ?
S3	274502	CONTROLKNOB? OR PUSHKNOB? OR PRESSKNOB? OR ACTUATOR? OR ACTUATER? OR PUSHACTUAT? OR PRESSACTUAT? OR ACTUATING?
S4	941966	INTERRUPT? OR ONOFF? OR ON()OFF OR NOGO OR NO()GO OR ABORT? OR TERMINAT? OR SHUTOFF? OR SHUT?()OFF OR POWEROFF? OR POWER-?()OFF OR PULSE?
S5	55362	HALT? OR ARREST? OR CEASE? OR CEASING? OR CESSAT? OR DESIST?
S6	4135897	EQUIVAL? OR PER OR PAIRED OR EACH OR DEDICATED? OR OWN OR - INDIVIDUAL? OR VERTYSAME?
S7	3280793	SEPARATE? OR DIFFERENT? OR SPECIFIC? OR DISTINCT? OR COMPLEMENTAR?
S8	1405975	CORRESPONDING? OR MATCHING? OR COUNTERPART? OR DESIGNAT? OR "SAME"() (AMOUNT? OR NUMBER?)
S9	1021618	BLADE? OR BOARD? OR PCB OR PCBS OR MOTHERBOARD? OR DAUGHTERBOARD? OR SERVERBLAD? OR SERVERBOARD? OR COMPUTERBOARD? OR COMPUTERBLAD?
S10	58705	LOCAL(2N)NETWORK? OR LAN OR LANS OR ETHERNET? OR INTRANET?
S11	2117732	PLURAL? OR MULTIP? OR MULTIT? OR SEVERAL? OR NUMEROUS?
S12	1385163	SERVER? OR CPU OR COMPUTER? OR WORKSTATION? OR WORK()STATION? OR (DATA OR CENTRAL OR MICRO)()PROCESSOR? OR PROCESSOR?
S13	81747	DATAPROCESSOR? OR MICROPROCESSOR? OR CENTRALPROCESSOR? OR - CPUS OR MAINFRAME?
S14	0	CUBIX?(20N) (XP4 OR XL4) OR CUBIXXP4 OR CUBIXXL4
S15	0	INTEL?(20N) (SBCE? OR SBXL? OR SBXL52? OR SBCECMM? OR SERVER?()MANAG?()MODUL?)
S16	1234496	IC=G06F?
S17	233633	MC=(T01-C? OR T01-F? OR T01C? OR T01F? OR T01()C? OR T01()-F?)
S18	11	S1 AND S2:S5 AND S9
S19	11	S1 AND S6:S8 AND S9 AND S10:S13
S20	60	S1(10N)S2:S5 AND S10:S13
S21	55	S20 AND S16:S17
S22	6	S21 AND S9
S23	60	S20:S21 AND S2:S5
S24	16	S18:S19 OR S22
S25	60	S20:S21 OR S23
S26	8	S24 AND S25
S27	16	S24 OR S26
S28	144513	PR=2004:2005
S29	16	S27 NOT S28
S30	46	S25 NOT S27:S28
S31	46	IDPAT (sorted in duplicate/non-duplicate order)

File 347:JAPIO Nov 1976-2005/Apr(Updated 050801)  
(c) 2005 JPO & JAPIO

File 350:Derwent WPIX 1963-2005/UD,UM &UP=200554  
(c) 2005 Thomson Derwent

31/3,K/32 (Item 32 from file: 350)  
DIALOG(R)File 350:Derwent WPIX  
(c) 2005 Thomson Derwent. All rts. reserv.

015492046 \*\*Image available\*\*  
WPI Acc No: 2003-554193/200352  
XRPX Acc No: N03-440002

Keyboard , video and mouse switch connected between workstation  
and computers is coupled to power control switching circuit that is  
operated to activate/deactivate power switching devices

Patent Assignee: CYBEX COMPUTER PROD CORP (CYBE-N)  
Inventor: BROWN S F; REED D D; SHATAS R G; WILDER D E  
Number of Countries: 001 Number of Patents: 001  
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
US 6557170	B1	20030429	US 9745608	P	19970505	200352 B
			US 9873178	A	19980505	

Priority Applications (No Type Date): US 9745608 P 19970505; US 9873178 A  
19980505

Patent Details:

Patent No	Kind	Lan Pg	Main IPC	Filing Notes
US 6557170	B1	14	H04N-001/173	Provisional application US 9745608

Keyboard , video and mouse switch connected between workstation  
and computers is coupled to power control switching circuit that is  
operated to activate/deactivate power switching devices

Abstract (Basic):

... A controller couples the keyboard , video , mouse ( KVM )  
switch (28) to a power control switching circuit (58) that  
activates/deactivates the power switching devices which are connected  
to computers (18,20,22,24). The operator at the workstation (26),  
operates the on-screen-display (OSD) interface (27) to control the  
power control switching circuit.

... For controlling power supply to computers connected to  
workstation through keyboard , video and mouse ( KVM ) switch .

...

...The switch verifies operator-password before providing access, thereby  
ensuring high-levels of security...

...The figure shows the block diagram of the keyboard , video and mouse  
( KVM ) switch .

...

... computers (18,20,22,24...

... workstation (26...

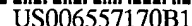
... KVM switch (28...

...power control switching circuit (58

...Title Terms: SWITCH ;

International Patent Class (Additional): G06F-011/00

Manual Codes (EPI/S-X): T01-C02 ...



(10) Patent No.: US 6,557,170 B1  
(45) Date of Patent: Apr. 29, 2003

(56) **References Cited**

U.S. PATENT DOCUMENTS

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5,793,999	A	*	8/1998	Mori	710/305
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5,968,116	A	*	10/1999	Day et al.	709/202
6,199,180	B1	*	3/2001	Ote et al.	714/31

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*Primary Examiner*—Chris Kelley

*Assistant Examiner*—Reuben M. Brown

(74) *Attorney, Agent, or Firm*—Nixon & Vanderhye P.C.

(57) **ABSTRACT**

A KVM switch is disclosed having on screen display (OSD) circuitry coupled to a user workstation for providing a user a convenient interface by which to operate the KVM switch. First switching circuitry coupled to a plurality of computers and coupled to the OSD circuitry allows a user to access any of the computers or the control functions of the KVM switch. Second switching circuitry coupled to switch electrical power to the computers and further coupled to the OSD circuitry allows a user of the KVM switch to selectively control electrical power to the computers.

**2 Claims, 9 Drawing Sheets**

### Related U.S. Application Data

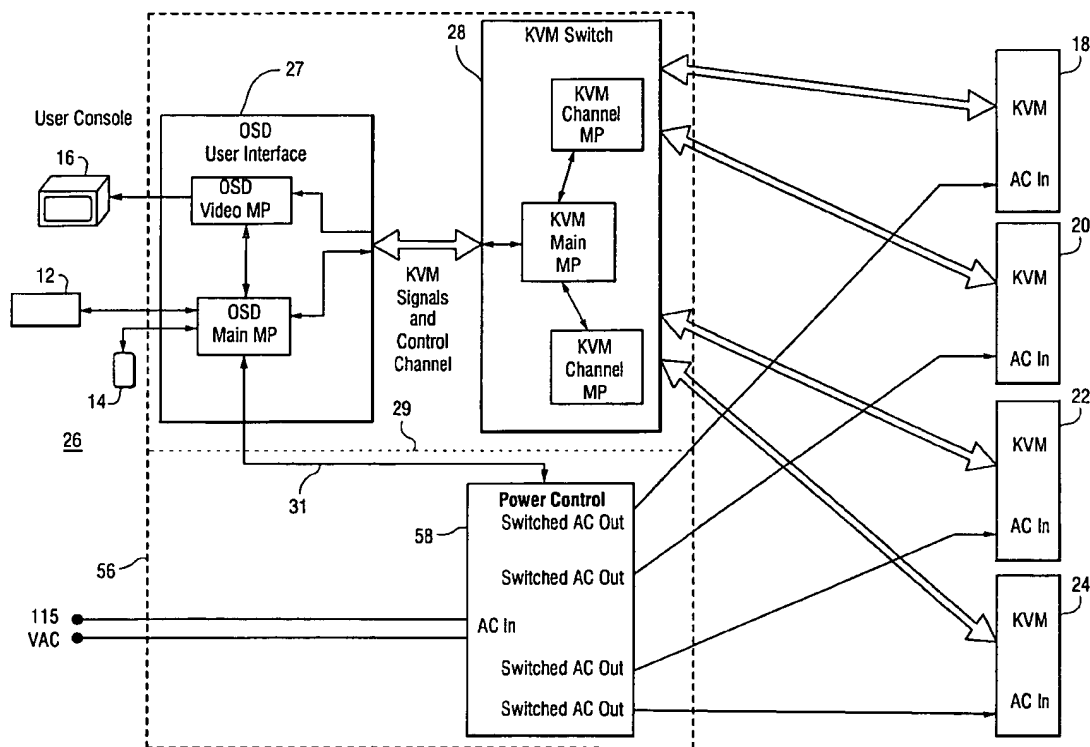
(60) Provisional application No. 60/045,608, filed on May 5, 1997.

(51) **Int. Cl.<sup>7</sup>** ..... **H04N 1/173; G06F 11/00**

(52) **U.S. Cl.** ..... **725/130; 713/300; 713/340;**

345/168; 710/72

(58) **Field of Search** ..... 725/87-150; 713/218,  
713/300-340; 345/168; 710/62-63, 72-73



ture. Further, a cold reboot may be performed where a computer "hangs up", or to correct other related problems.

FIG. 9 shows operation of the administrator channel list, which is initiated as a result of a YES reply at box 150 of FIG. 7. Here, at box 168, all channels are available to the administrator for KVM switching, and the administrator is prompted to provide an input. At box 170, the test is made as to whether the administrator elected to operate the KVM switch to go to a different computer channel or proceed to the administrator command menu. Where a different computer channel is selected, the program falls through to box 172, where the switching command is sent via the KVM command channel to switch to the selected computer channel. Where the administrator command menu is selected at box 170, the program proceeds to box 174, which provides the administrator with menu options that include power control to the computers, channel maintenance, administrative functions, and computer channel scanning functions. These functions are further detailed at boxes 176, 178, 180, 182. At box 176, computer channel maintenance includes adding or deleting one or more computer channels and changing one or more computer channel addresses. At box 178, power control includes turning an outlet to one or more computers on or off, rebooting computers, and setting power-up default states for the computers. Box 180 includes administrative functions such as changing an administrative password, adding or deleting users, changing user passwords, and changing a users access level. At box 182, scanning functions include changing scanning order of the computer channels, changing the dwell time a computer channel is presented on the console monitor, and activate scanning of the computer channels.

While a single KVM switch coupled to 4 computers and a single workstation is disclosed in the foregoing, multiple KVM switches may be connected to a single KVM switch in place of the computers to form an array of KVM switches. This cascaded arrangement may be extended as needed, and allows a greater number of computers to be accessed by a single workstation. Further, up to four workstations may be coupled to a single KVM switch through the use of expansion devices such as the PC COMPANION or PC EXPANDER, manufactured by CYBEX COMPUTER PRODUCTS CORPORATION, of Huntsville, Ala., in place of the single workstation. Here, a plurality of workstations may be coupled to the PC COMPANION or EXPANDER-type product, which in turn provides inputs to a KVM switch or array of switches of the present invention. Further, extension devices, also manufactured by CYBEX COMPUTER PRODUCTS CORPORATION, allow for remotely locating the computers and workstations from the KVM switch or KVM switch array.

Having disclosed our invention and the manner of its use, it should be apparent that incidental changes may be made thereto that fairly fall under the scope of the following appended claims, wherein we claim:

What is claimed is:

1. A keyboard, video and mouse switch comprising:

a plurality of sets of computer signal ports, each of said sets of computer signal ports adapted to pass at least video signals, keyboard signals and cursor control signals,

at least one set of user interface signal ports for passing at least said video signals, said keyboard signals and said cursor control signals,

a source of AC electrical power potentials,

a plurality of switched AC power ports for selectively providing said AC electrical power potentials,

user interface circuitry responsive to said set of user interface signal ports, said user interface circuitry having a first control channel and a second control channel, signal switching circuitry responsive to said user interface circuitry and coupled to said first control channel and said plurality of sets of computer signal ports,

power switching circuitry responsive to said user interface circuitry and coupled to said source of AC electrical power potentials, said second control channel and said plurality of switched AC power ports so that said AC electrical power potentials are selectively provided from discrete ones of said plurality of switched AC power ports,

whereby at least one of said plurality of sets of computer signal ports is selectively couplable to said set of user interface ports, and said AC electrical power potentials are selectively couplable to said switched AC power ports,

wherein said user interface circuitry further comprises at least one menu display including menu options for controlling said power switching circuitry, and

wherein said power switching circuitry further comprises: a power control microprocessor having a plurality of outputs and a communications port coupled to said second control channel,

a plurality of switching means each having a control input and first and second switched terminals, one of each said control input coupled to one of each of said plurality of outputs, and said first and second switched terminals coupled between said AC electrical power potentials and a one of said AC power ports so that said AC electrical power potentials are selectively provided at said AC power ports responsive to said power control microprocessor.

2. A keyboard, video and mouse switch as set forth in claim 1 wherein said power control microprocessor, said switching means and said switched AC power ports are configured as a discrete, separate component from said keyboard, video and mouse switch.

\* \* \* \* \*

29/3,K/4 (Item 4 from file: 350)  
DIALOG(R)File 350:Derwent WPIX  
(c) 2005 Thomson Derwent. All rts. reserv.

016328262 \*\*Image available\*\*  
WPI Acc No: 2004-486159/200446  
XRPX Acc No: N04-383375

Blade server system for office, has integrated switch connected to decoder to receive command information and operate according to command information, where output port transmits signals between peripheral devices and blade server

Patent Assignee: HUANG J (HUAN-I); WU C (WUCC-I); QUANTA COMPUTER INC (QUAN-N)

Inventor: HUANG J; WU C

Number of Countries: 001 Number of Patents: 002

Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
US 20040098532	A1	20040520	US 2002295888	A	20021118	200446 B
US 6931475	B2	20050816	US 2002295888	A	20021118	200554

Priority Applications (No Type Date): US 2002295888 A 20021118

Patent Details:

Patent No Kind Lan Pg Main IPC Filing Notes

US 20040098532 A1 6 G06F-013/00

US 6931475 B2 G06F-013/00

Blade server system for office, has integrated switch connected to decoder to receive command information and operate according to command information, where output port transmits signals between peripheral devices and blade server

Abstract (Basic):

... The system (100) has a management board connected to a chassis to control the system. Blade servers (120) are inserted on the chassis. An integrated switch connected to a decoder receives command information and switch according to the command information. An output port is connected with the chassis and peripheral devices to transmit signals between the peripheral devices and the selected blade server .

... Each server has a decoder connected to the chassis to receive an encoded data from the management board and decodes the encoded data to command information when one of the blade servers is selected...

...The system reduces the space of the servers and eliminates the risk caused by the keyboard , video monitor and mouse ( KVM ) switch blade damage. The system saves a blade server socket and avoids the risk of losing control of the blade servers due to the failure of the KVM switch blade to work...

...The drawing shows a schematic diagram of a blade server system connected with the peripheral devices and a network...

... Blade server system (100...

... Blade servers (120...

...Select button (122

Title Terms: BLADE ;

International Patent Class (Main): G06F-013/00

International Patent Class (Additional): G06F-013/14

Manual Codes (EPI/S-X): T01-C02A ...

... T01-C02B ...

... T01-C04



US006931475B2

(12) **United States Patent**  
**Huang et al.**

(10) **Patent No.:** **US 6,931,475 B2**  
(45) **Date of Patent:** **Aug. 16, 2005**

(54) **BLADE SERVER SYSTEM WITH KVM SWITCHES**

(75) Inventors: **Jen-Shuen Huang**, Pateh (TW);  
**Cheng-Hsiang Wu**, Taoyuan (TW)

(73) Assignee: **Quanta Computer Inc.**, Tao Yuan  
Shien (TW)

(\*) Notice: Subject to any disclaimer, the term of this  
patent is extended or adjusted under 35  
U.S.C. 154(b) by 338 days.

(21) Appl. No.: **10/295,888**

(22) Filed: **Nov. 18, 2002**

(65) **Prior Publication Data**

US 2004/0098532 A1 May 20, 2004

(51) Int. Cl.<sup>7</sup> ..... **G06F 13/00**; G06F 13/14

(52) U.S. Cl. .... **710/316**; 710/305; 361/683

(58) Field of Search ..... 710/1, 300, 305,  
710/316; 709/201, 223, 227; 712/29, 208;  
370/908; 361/683, 686, 727, 752

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6,762,932 B2 \* 7/2004 Regimbal et al. .... 361/683  
6,807,056 B2 \* 10/2004 Kondo et al. .... 361/689

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Switches and ManageSite Software"; Aug. 5, 2002. [http://  
www.amphus.com/news/press\\_release.asp?id=26](http://www.amphus.com/news/press_release.asp?id=26);  
TUD-2016 Ultra-Dense Blade Server, Tatung Science &  
Technology, Inc., Fremont, CA 94639, 5 pages.

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Primary Examiner—Gopal C. Ray

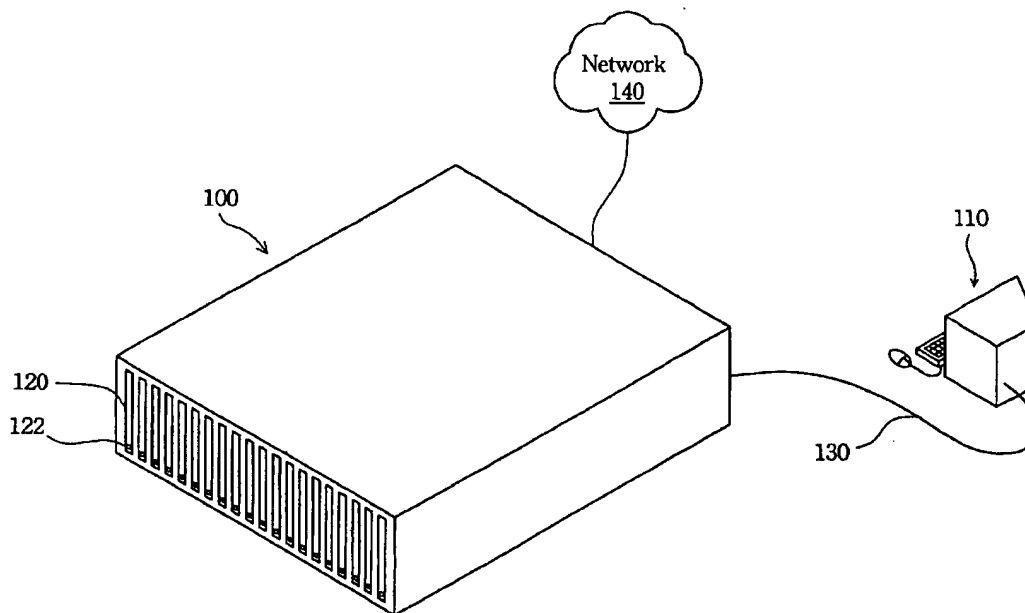
(74) Attorney, Agent, or Firm—Rabin & Berdo, P.C.

(57)

#### ABSTRACT

A blade server system with integrated KVM switches is described. The blade server system has a chassis, a management board, a plurality of blade servers, and an output port. Each of the blade servers has a decoder and a switch. Each of the blade servers further has a select button and a processor. The decoder receives an encoded data from the management board and decodes the encoded data into command information when one of the blade servers is selected. The switch receives the command information and is switched according to the command information. The command information indicates which switch is to be turned on and which are to be turned off. The output port connects the peripheral devices for controlling the selected blade server. The management board may determine which blade server is to be selected by the button condition, commands from the peripheral devices or a request from a network computer.

**16 Claims, 2 Drawing Sheets**



29/3,K/10 (Item 10 from file: 350)  
DIALOG(R)File 350:Derwent WPIX  
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015006319 \*\*Image available\*\*  
WPI Acc No: 2003-066836/200306  
XRPX Acc No: N03-051837

**Integrated modular server array for computer system, has server cards which controls two expansion cards using peripheral component interconnect signals routed through CPCI J1 bus**

Patent Assignee: QIU M (QIUM-I)

Inventor: QIU M

Number of Countries: 099 Number of Patents: 006

Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
US 20020124128	A1	20020905	US 2000259381	P	20001229	200306 B
			US 200138493	A	20011231	
WO 200269076	A2	20020906	WO 2001US50710	A	20011231	200306
EP 1356359	A2	20031029	EP 2001273869	A	20011231	200379
			WO 2001US50710	A	20011231	
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Priority Applications (No Type Date): US 2000259381 P 20001229; US

200138493 A 20011231

Patent Details:

Patent No	Kind	Lan Pg	Main IPC	Filing Notes
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US 20020124128	A1	33	H05K-007/10	Provisional application US 2000259381
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WO 200269076 A2 E G06F-000/00

Designated States (National): AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA  
CH CN CO CR CU CZ DE DK DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN  
IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ  
PH PL PT RO RU SD SE SG SI SK SL TJ TM TR TT TZ UA UG US UZ VN YU ZA ZW  
Designated States (Regional): AT BE CH CY DE DK EA ES FI FR GB GH GM GR  
IE IT KE LS LU MC MW MZ NL OA PT SD SE SL SZ TR TZ UG ZM ZW

EP 1356359 A2 E G06F-001/00 Based on patent WO 200269076

Designated States (Regional): AL AT BE CH CY DE DK ES FI FR GB GR IE IT  
LI LT LU LV MC MK NL PT RO SE SI TR

AU 2001297630 A1 H05K-007/10 Based on patent WO 200269076

JP 2004519770 W 122 G06F-001/18 Based on patent WO 200269076

CN 1503946 A G06F-013/00

**Integrated modular server array for computer system, has server cards which controls two expansion cards using peripheral component interconnect signals routed through CPCI J1...**

Abstract (Basic):

... A compact PCI (CPCI) J2 bus formed on a midplane, connects **processor** cards, hard drive cards and a **keyboard**, mouse and video **switch**. Power supply cards supply power to the **processor** and drive cards through the CPCI J2 bus. CPCI J1 female connectors on **each server** cards, has pinouts whose mirror images are on **each** expansion cards. **Each** of the **server** cards controls at least two of the expansion cards, using PCI signals routed through the...

... Integrated modular **server** array for **computer** system...

...As the **processor** card controls two expansion cards through the CPCI J1 bus pass through the midplane **board**, the efficiency of the **server**

is increased. The hot swap capability of the CPCI allows replacement of cards, if one or more cards fail during operation of the **server** , thereby the **server** system is easily upgradable and expandable...

...shows the pinout diagram for male J1 connectors of the front side of the panel **board** .

...Title Terms: **MODULE** ;

International Patent Class (Main): **G06F-000/00** ...

... **G06F-001/00** ...

... **G06F-001/18** ...

... **G06F-013/00**

International Patent Class (Additional): **G06F-013/00**

Manual Codes (EPI/S-X): **T01-C07C5** ...



US 20020124128A1

(19) **United States**(12) **Patent Application Publication**  
**Qiu**(10) Pub. No.: **US 2002/0124128 A1**(43) Pub. Date: **Sep. 5, 2002**(54) **SERVER ARRAY HARDWARE  
ARCHITECTURE AND SYSTEM**

(52) U.S. Cl. .... 710/302

(76) Inventor: **Ming Qiu, Reno, NV (US)**(57) **ABSTRACT**

Correspondence Address:

**OPPENHEIMER WOLFF & DONNELLY LLP  
2029 CENTURY PARK EAST  
38TH FLOOR  
LOS ANGELES, CA 90067-3024 (US)**(21) Appl. No.: **10/038,493**(22) Filed: **Dec. 31, 2001****Related U.S. Application Data**(60) Provisional application No. 60/259,381, filed on Dec.  
29, 2000.**Publication Classification**(51) Int. Cl.<sup>7</sup> ..... **H05K 7/10; G06F 13/00**

A midplane board of a high-density server has mounted to it eight processor cards having modified CPCI form factors, multiple hard drive cards and a KMV switch card, all networked together using redundant network control cards through network connections formed from a CPCI J2 bus. Power is supplied to the processor cards by redundant power supply cards through the CPCI J2 bus as well. The processor cards and power supply cards are mounted to the back side of the midplane board while the multiple hard drive cards, the KMV switch card and expansion cards are mounted to the front side of the midplane board. All cards are hot swappable and configured horizontally on the midplane board. Each processor card controls two expansion cards through the CPCI J1 bus passing through the midplane board. The processor card pinout is the mirror image of that of traditional CPCI front side processor cards.

25	GND	5V	REQ64#	ENUM#	3.3V	5V	GND	J1
24	GND	AD[1]	5V	V(I/O)	AD[0]	ACK64#	GND	
23	GND	3.3V	AD[4]	AD[3]	5V	AD[2]	GND	
22	GND	AD[7]	GND	3.3V	AD[6]	AD[5]	GND	
21	GND	3.3V	AD[9]	AD[8]	M66EN	C/BE[0]#	GND	
20	GND	AD[12]	GND	V(I/O)	AD[11]	AD[10]	GND	
19	GND	3.3V	AD[15]	AD[14]	GND	AD[13]	GND	
18	GND	SERR#	GND	3.3V	PAR	C/BE[1]#	GND	
17	GND	3.3V	SDONE	SBO#	GND	PERR#	GND	
16	GND	DEVSEL#	GND	V(I/O)	STOP#	LOCK#	GND	
15	GND	3.3V	FRAME#	IRDY#	GND	TRDY#	GND	CONN
12-14	KEY AREA							
11	GND	AD[18]	AD[17]	AD[16]	GND	C/BE[2]#	GND	
10	GND	AD[21]	GND	3.3V	AD[20]	AD[19]	GND	
9	GND	C/BE[3]#	IDSEL	AD[23]	GND	AD[22]	GND	
8	GND	AD[26]	GND	V(I/O)	AD[25]	AD[24]	GND	
7	GND	AD[30]	AD[29]	AD[28]	GND	AD[27]	GND	
6	GND	REQ#	GND	3.3V	CLK	AD[31]	GND	
5	GND	BRSVP1A5	BRSVP1B5	RST#	GND	GNT#	GND	
4	GND	BRSVP1A4	GND	V(I/O)	INTP	INTS	GND	
3	GND	INTA#	INTB#	INTC#	5V	INTD#	GND	R
2	GND	TCK	5V	TMS	TDO	TDI	GND	
1	GND	5V	-12V	TRST#	+12V	5V	GND	
Pin	Z	A	B	C	D	E	F	

additional electrically conductive leads pass through the midplane board electrically connecting at least two of the multiple expansion cards to at least one of the multiple midplane board back-side connectors; and

the processor card is one of multiple processor cards each having a processor-card connector connected to the midplane board back-side connectors such that the pinout assignments of the additional processor cards are the mirror images of the pinout assignments of the expansion cards and so that at least one of the processor cards can control at least two of the expansion cards.

6. The server of claim 5, further comprising:

conductive traces extending along the midplane board electrically connecting the processor cards; and

a network control card connected to the conductive traces and controlling a network formed between the processor cards and conductive traces.

7. The server of claim 6, wherein the network further comprises a KMV switch for switching electrical communications between a keyboard, mouse and video switch and the multiple processor cards.

8. The server of claim 6, wherein the network control card is one of the set consisting of a network switch, a network hub, a fiber channel arbitrate loop hub and a fiber channel arbitrate loop switch.

9. The server of claim 6, wherein the conductive traces connect the processor cards to the network control card in a daisy-chain or star network configuration.

10. The server of claim 6, further comprising additional redundant network control cards electrically connected to the processor cards via the traces for controlling the network.

11. The server of claim 6, wherein the network further comprises a fiber channel hard drive connected to the front side of the midplane board.

12. The server of claim 6, further comprising multiple power supply cards attached to the midplane for supplying power to the processor cards via the traces.

13. The server of claim 4, wherein:

the midplane board front-side connector has a first half with 5 rows of 22 midplane board front-side connector pins;

the expansion-card connector has a first half with 5 rows of 22 sockets for receiving the midplane board front-side connector pins thus forming a front-side connection interface;

the midplane board back-side connector has a first half with 5 rows of 22 midplane board back-side connector pins

the processor-card connector has a first half with 5 rows of 22 sockets for receiving the midplane board back-side connector pins thus forming a back-side connection interface; and

wherein the back-side connection interface is the mirror image of the front-side connection interface.

14. The high-density server of claim 4, wherein the pinout assignments of the expansion card are standard J1 CompactPCI assignments and the processor card is configured to utilize the mirror image of standard J1 CompactPCI pinout assignments.

15. A high-density server comprising:

a midplane board having opposing front and back sides;

multiple processor cards physically and electrically connected to the midplane board;

multiple network control cards physically and electrically connected to the midplane board; and

multiple power supply cards physically and electrically connected to the midplane board.

16. The high-density server of claim 15, wherein the processor cards, network control cards and power supply cards are connected to the midplane board via CompactPCI connectors.

17. The high-density server of claim 16, wherein the processor cards have pinout definitions the mirror image of J1 CompactPCI front side pinout definitions.

18. The high-density server of claim 16, wherein pin connectors are attached to the midplane board and socket connectors are attached to the processor cards, network control cards and power supply cards and wherein pins of the pin connectors are secured into sockets of the socket connectors to physically and electrically connect the multiple processor cards, multiple network control cards and multiple power supply cards to the midplane.

19. The high-density server of claim 15, further comprising a KMV switch physically and electrically connected to the midplane board.

20. The high-density server of claim 15, further comprising multiple fiber channel hard drive cards physically and electrically connected to the midplane board.

21. The high-density server of claim 15, wherein the network control cards are selected from the group consisting of a network switch, a network hub, a fiber channel arbitrate loop hub and a fiber channel arbitrate loop switch.

22. The high-density server of claim 16, wherein at least one of the multiple processor cards controls at least two expansion cards through a J1 portion of a CompactPCI connector.

23. The high-density server of claim 16, further comprising conductive traces extending along the midplane board to electrically connect the multiple processor cards, multiple network control cards and multiple power supply cards through J2 portions of the CompactPCI connectors.

24. The high-density server of claim 23, wherein the multiple network control cards control through J2 portions of the CompactPCI connectors a network formed from the multiple processor cards, multiple network control cards, multiple power supply cards and connecting conductive traces.

25. The server of claim 24, wherein the conductive traces connect the multiple processor cards, multiple network control cards, and multiple power supply cards in a daisy-chain or star network configuration.

26. The server of claim 24, further including a chassis enclosing the midplane board, multiple processor cards, multiple network control cards, and multiple power supply cards.

27. The server of claim 24, wherein the processor cards, network control cards and power supply cards are hot swappable so that any of the cards can be replaced without shutting down the network.

29/3,K/14 (Item 14 from file: 350)  
DIALOG(R)File 350:Derwent WPIX  
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014028374 \*\*Image available\*\*  
WPI Acc No: 2001-512588/200156  
XRPX Acc No: N01-379478

**Peripheral device emulator**

Patent Assignee: INT BUSINESS MACHINES CORP (IBMC )

Number of Countries: 001 Number of Patents: 001

Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
RD 440162	A	20001210	RD 2000440162	A	20001120	200156 B

Priority Applications (No Type Date): RD 2000440162 A 20001120

Patent Details:

Patent No	Kind	Lan Pg	Main IPC	Filing Notes
RD 440162	A	2	G06F-000/00	

Abstract (Basic):

... a keyboard, pointing device, etc. by responding to the peripheral device controller of a system **motherboard** with the responses that are expected during POST (Power On Self Test) and the boot-up of an Operating System. In a peripheral **switch** environment, such as that dealing with **Keyboard / Video / Mouse** devices, the peripherals are connected to only one system at a time. When a rack...

...daisy-chain connection scheme in a dense environment of rack mounted systems. Functionally, if the **switch** control circuit has enabled the connection of the peripheral device controller to the peripheral device, the device emulator is disabled. If, however, the **switch** control unit has disabled the connection of the peripheral device controller to the peripheral device...

## **Peripheral Device Emulator**

Disclosed is a circuit that emulates the behavior of peripheral devices such as a keyboard, pointing device, etc.. by responding to the peripheral device controller of a system motherboard with the responses that are expected during POST (Power On Self Test) and the boot-up of an Operating System.

In a peripheral switch environment, such as that dealing with Keyboard / Video / Mouse devices, the peripherals are connected to only one system at a time. When a rack filled with systems is powered up, all the systems will concurrently perform testing for the presence of the devices during the execution of POST, then again when the Operating System boots up. If the system unit fails to receive the proper response from a peripheral device, an error is declared and the device is deemed to be malfunctioning and/or declared as "not connected". By implementing a circuit that responds in the manner that the peripheral device would (if it were connected) the advantages that are derived are the avoidance of unnecessary error messages, as well as the improvement of test coverage. The latter is specially crucial when employing a serial, daisy-chain connection scheme in a dense environment of rack mounted systems.

Functionally, if the switch control circuit has enabled the connection of the peripheral device controller to the peripheral device, the device emulator is disabled. If, however, the switch control unit has disabled the connection of the peripheral device controller to the peripheral device, the device emulator is enabled and will respond as if the peripheral device was connected.

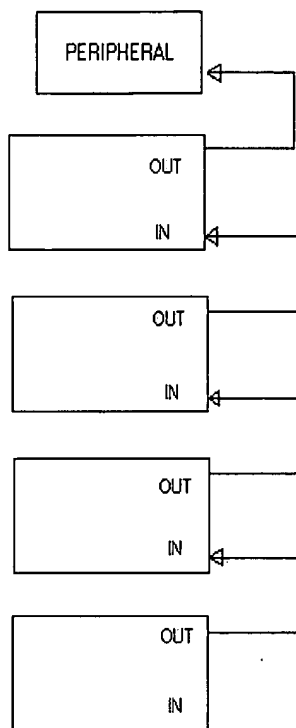


Figure 1  
Rack switch topology which connects the peripheral controller interface of one rack mounted computer to the preceding computer. Only the last computer in the chain needs to be connected to the peripheral.

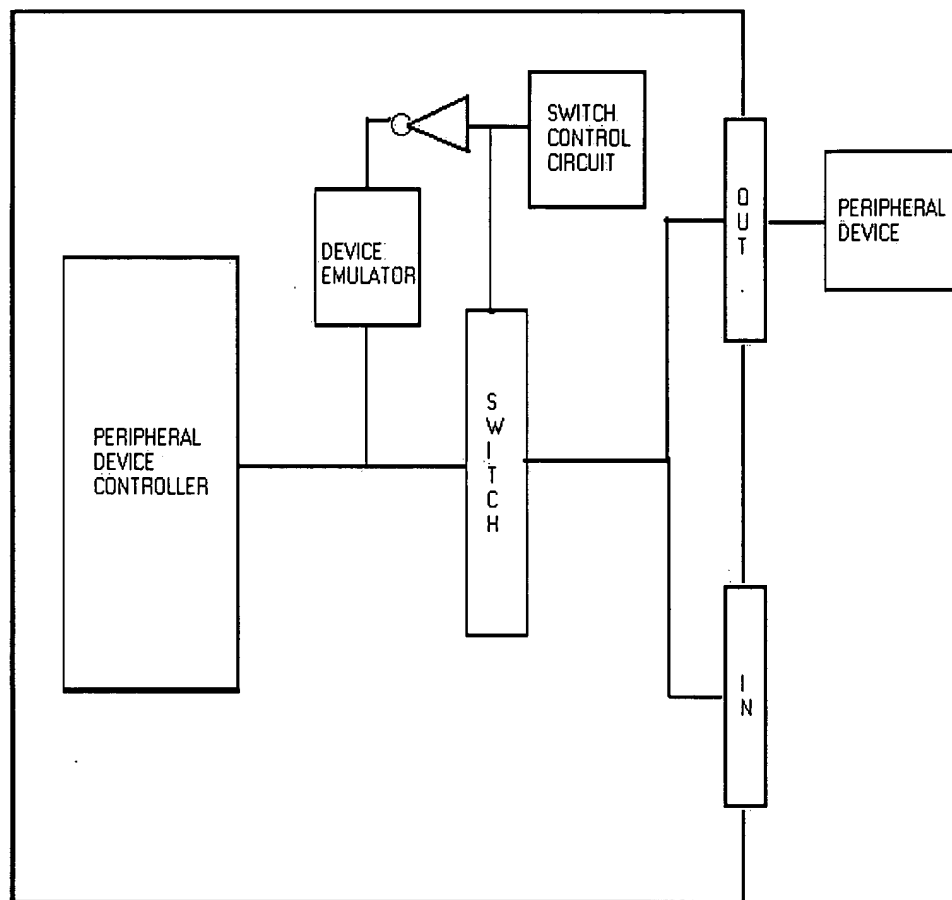


Figure 2: Showing the connection of the Peripheral Device Emulator to the motherboard and Peripheral Switch circuit. The emulator will only respond as the peripheral device when the switch is not selected, in bypass mode. When the Peripheral Device Controller is connected to the Peripheral Device (switch is enabled) the Device Emulator is disabled.

31/3,K/22 (Item 22 from file: 350)  
DIALOG(R)File 350:Derwent WPIX  
(c) 2005 Thomson Derwent. All rts. reserv.

015903099 \*\*Image available\*\*  
WPI Acc No: 2004-060939/200406  
Related WPI Acc No: 2003-800228  
XRPX Acc No: N04-049376

Switch node for computer network, has switch node operating system  
that are interconnected to configure cross connect to provide determined  
path between selected server and keyboard video mouse combination

Patent Assignee: AMBROSE D H (AMBR-I)

Inventor: AMBROSE D H

Number of Countries: 001 Number of Patents: 001

Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
US 20030227929	A1	20031211	US 99421494	A	19991020	200406 B
			US 2003390199	A	20030317	

Priority Applications (No Type Date): US 99421494 A 19991020; US 2003390199  
A 20030317

Patent Details:

Patent No	Kind	Lan Pg	Main IPC	Filing Notes
US 20030227929	A1	8	H04L-012/28	Cont of application US 99421494
				Cont of patent US 6615272

Switch node for computer network, has switch node operating system  
that are interconnected to configure cross connect to provide determined  
path between selected server and keyboard video mouse combination

Abstract (Basic):

... KVM) combination port (15) to which a KVM is connected. The KVM  
is connected to **server** ports (16) and expansion port (14) of other  
**switch** nodes through a cross connect (38). The interconnected node  
operating systems (31) determine a path for a connection between the  
KVM and the selected **server** to configure the cross connects and to  
provide the determined path.

... An internode link provides communication between node operating  
system of the **switch** nodes...

...Used for **switching** keyboard, monitor and mouse connections in  
computer network...

...The drawing shows a hyper **switch** node...

... **Server** ports (16

Title Terms: **SWITCH** ;

Manual Codes (EPI/S-X): T01-C03A ...

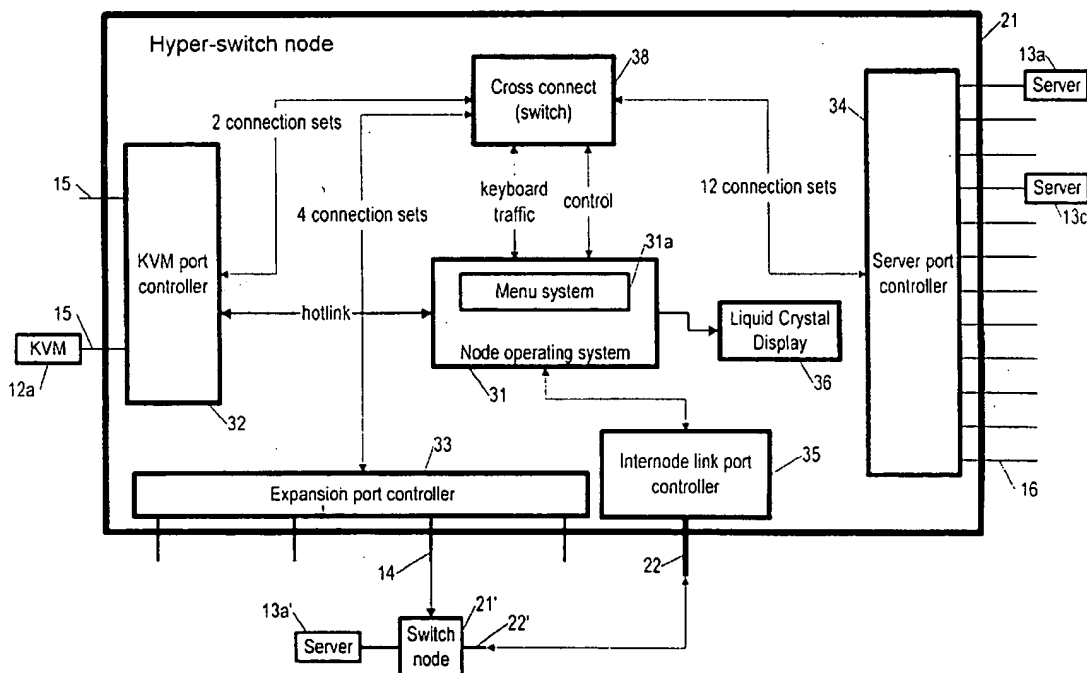
... T01-F05B2



US 20030227929A1

(19) **United States**(12) **Patent Application Publication** (10) Pub. No.: **US 2003/0227929 A1**  
Ambrose (43) Pub. Date: **Dec. 11, 2003**(54) **SWITCH NODE FOR CONNECTING A  
KEYBOARD VIDEO MOUSE TO SELECTED  
SERVERS IN A INTERCONNECTED SWITCH  
NODE NETWORK**(76) Inventor: **David H. Ambrose, Monroe, CT (US)**Correspondence Address:  
**William J. Brucker, Esq.**  
**STETINA BRUNDA GARRED & BRUCKER**  
75 Enterprise, Suite 250  
Aliso Viejo, CA 92656 (US)(21) Appl. No.: **10/390,199**(22) Filed: **Mar. 17, 2003****Related U.S. Application Data**(63) Continuation of application No. 09/421,494, filed on  
Oct. 20, 1999, now Pat. No. 6,615,272.**Publication Classification**(51) Int. Cl.<sup>7</sup> ..... **H04L 12/28**(52) U.S. Cl. .... **370/401; 370/463**(57) **ABSTRACT**A switch node used for connecting a keyboard video mouse  
combination (KVM) and a server in an array of servers,

some of which may be attached (directly) to the switch node, and others of which may be attached to another switch node in a network of interconnected switch nodes. The node includes at least one keyboard video monitor combination (KVM) port for attaching a KVM; a plurality of server ports for attaching a plurality of servers; a plurality of expansion ports connecting to other switch nodes in the network of switch nodes; a cross connect, for providing an interconnection between each KVM and one of the server ports or one of the expansion ports; and a node operating system, for providing to a user, using one of the KVMs, an indication of each server in the array of servers, for determining a path to use for a connection between the KVM and a server, for configuring the cross connect to provide the path based on information provided by the node operating systems of other switch nodes in the network of switch nodes, and for requesting others of the switch nodes to configure their respective cross connects so as to provide the path determined by the node operating system; and an internode link port, for providing a network connection enabling communication between the node operating system of the switch node and the node operating system of other switch nodes in the array of switch nodes, the network connection (internode link) being the connection through which the switch node learns of available connections to servers attached to the other switch nodes and available connections between the other switch nodes.



38 to connect, via the respective port controllers, the server 13a to the KVM 12a. The connection provided by the cross connect 38 enables communication from the keyboard and mouse of KVM 12a (i.e. keyboard and mouse signals) to the server 13a, and for communication (video output) from the server 13a to the monitor of KVM 12a. The communication proceeds through the KVM controller 32 and the server port controller 34.

[0026] To connect to a server 13' attached to another hyper-switch node 21', i.e. a non local server 13', a user operating the attached KVM 12a selects from the menu system 31a to connect to the non local server 13' either by name, or by pointing to the server 13' in a node topology displayed by the menu system 31a. The node topology displayed by the menu system 31 indicates the various connected servers using information it obtains dynamically, at the time a request is made to indicate the node topology or to provide a list of available servers 13. Once the user indicates a server 13' to which to be provided access, the node operating system 31 determines a connection path to use for the access. In case of a network of five or less hyper-switch nodes, in the preferred embodiment of four expansion ports, a direct path might be available for any server, i.e. a path through only a single additional hyper-switch node 21'. If however, the direct path is not available or if there is no direct path, the node operating system 31 will determine another path. Each hyper-switch node 21 interrogates each other hyper-switch node it is directly connected to using the connections provided through the expansion ports 14. However, all other network information is acquired via the internode link 29, by querying each other hyper-switch node 21'21"21'"21"" in the network whenever such other information is needed. Then, in hunting for a path for an indirect connection, the node operating system 31 performs a path hunt algorithm, using the current state of each connection in the network acquired through the interrogation, i.e. using the acquired knowledge about each individual connection.

[0027] In determining an indirect path, the node operating system interrogates one or more other node operating systems as to what connections are available. The interrogation prompts each interrogated switch node to provide what connections to attached servers are available, as well as what direct connections to other switch nodes are available. After performing the path hunt and so determining an indirect path, the node operating system configures not only its own cross connect 38, but also requests that other of the node operating system configure their respective cross connects so as to provide each of the connections needed for the indirect path.

[0028] It is to be understood that the above-described arrangements are only illustrative of the application of the principles of the present invention. In particular, it is obvious that the present invention is not intended to be limited to an

architecture in which there are in particular four expansion ports, two KVM ports, or twelve server ports. Although such a hyper-switch node is a good choice in a wide range of real world applications, a hyper-switch node having fewer or more expansion ports or KVM ports or server ports is also useful, depending on the application. The advantages of the present invention accrue as long as there are at least two expansion ports and at least two server ports, and at least one KVM port. Beside differences such as these, numerous other modifications and alternative arrangements from what is disclosed here may be devised by those skilled in the art without departing from the spirit and scope of the present invention, and the appended claims are intended to cover such modifications and arrangements.

What is claimed is:

1. A switch node, for connecting a keyboard video mouse (KVM) combination and a server in an array of servers, each server attached to the switch node or attached to another switch node, all of the switch nodes constituting a network of interconnected switch nodes, the switch node comprising:

- a) a KVM port for providing a connection to an attached KVM;
- b) a plurality of server ports for providing connections to a plurality of attached servers;
- c) a plurality of expansion ports for providing connections to other switch nodes in the network of switch nodes;
- d) a cross connect, for providing connections between the KVM and one of the server ports or one of the expansion ports;
- e) a node operating system, for providing to a user of the KVM an indication of each server in the array of servers, for determining a path to use for a connection between the KVM and a server selected by the user, for configuring the cross connect to provide the path, for requesting others of the switch nodes to configure their respective cross connects so as to provide the path determined; and
- f) an internode link port, for providing a network connection enabling communication between the node operating system of the switch node and the node operating system of other switch nodes in the network of switch nodes.

2. A switch node as in claim 1, wherein the configuring of the cross connect to provide the path is based on information provided by the node operating systems of other switch nodes in the network of switch nodes.

3. A switch node as in claim 1, wherein the requesting of others of the switch nodes to configure their respective cross connects so as to provide the path determined is according to directions provided by the switch node.

\* \* \* \* \*

31/3,K/25 (Item 25 from file: 350)  
DIALOG(R)File 350:Derwent WPIX  
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015738027 \*\*Image available\*\*  
WPI Acc No: 2003-800228/200375  
Related WPI Acc No: 2004-060939  
XRPX Acc No: N03-641131

**Hyper switch node for computer , has operating system which determines whether direct cross connect path or indirect path is required between user's keyboard video monitor and user selected server**

Patent Assignee: LANTRONIX INC (LANT-N)  
Inventor: AMBROSE D H  
Number of Countries: 001 Number of Patents: 001  
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
US 6615272	B1	20030902	US 99421494	A	19991020	200375 B

Priority Applications (No Type Date): US 99421494 A 19991020

Patent Details:

Patent No	Kind	Lan Pg	Main IPC	Filing Notes
US 6615272	B1	8	G06F-015/173	

**Hyper switch node for computer , has operating system which determines whether direct cross connect path or indirect path is required between user's keyboard video monitor and user selected server**

Abstract (Basic):

... An operating system (31) connected to **switch** nodes (21) through internode link (22), determines whether a direct cross connect path or indirect path is required between keyboard video monitor (KVM) and user selected **server** . The system configures a specific cross connect path between KVM and **server** if direct path is determined, else requests other nodes to configure cross connects for determined...

... For connecting components to **computer** such as **keyboard** , **video monitor** and **mouse** , to selected **server** in interconnected **switch** node network...

...Since the **switch** node allows a user of **KVM** attached to the **switch** node to access not only the **servers** attached directly to the **switch** node, but also to access **servers** attached to any other **switch** node, with or without connecting directly to the intermediate **switch** nodes, thus a connection even if equipment malfunction blocks the most direct connection path is...

...The figure shows the block diagram of the hyper **switch** nodes...

... **server** (13...

... **switch** node (21

...Title Terms: **SWITCH** ;

International Patent Class (Main): **G06F-015/173**

Manual Codes (EPI/S-X): **T01-C02** ...



US006615272B1

(12) **United States Patent**  
**Ambrose**

(10) **Patent No.:** **US 6,615,272 B1**  
(45) **Date of Patent:** **Sep. 2, 2003**

(54) **SWITCH NODE FOR CONNECTING A KEYBOARD VIDEO MOUSE TO SELECTED SERVERS IN A INTERCONNECTED SWITCH NODE NETWORK**

(75) **Inventor:** **David H. Ambrose, Monroe, CT (US)**

(73) **Assignee:** **Lantronix, Inc., Irvine, CA (US)**

(\*) **Notice:** Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) **Appl. No.:** **09/421,494**

(22) **Filed:** **Oct. 20, 1999**

(51) **Int. Cl.<sup>7</sup>** ..... **G06F 15/173; H04L 12/28; H04L 12/56**

(52) **U.S. Cl.** ..... **709/238; 709/219; 370/351; 370/400**

(58) **Field of Search** ..... **709/238, 219; 370/400, 351**

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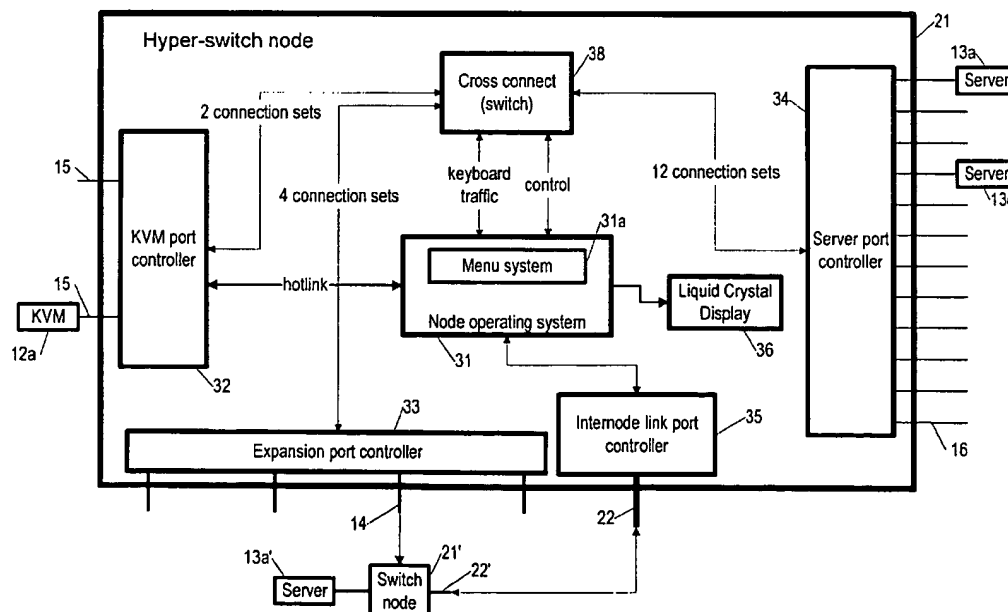
*Primary Examiner*—Frantz B. Jean

(74) *Attorney, Agent, or Firm*—Sletina Brunda Garred & Brucker

(57) **ABSTRACT**

A switch node used for connecting a keyboard video mouse combination (KVM) and a server in an array of servers, some of which may be attached (directly) to the switch node, and others of which may be attached to another switch node in a network of interconnected switch nodes. The switch node includes at least one keyboard video mouse combination (KVM) port; a plurality of server ports; a plurality of expansion ports connecting to other switch nodes in the network of switch nodes; a cross connect, for providing an inter-connection between each KVM and one of the server ports or one of the expansion ports; and a node operating system, for providing a user one of the KVMs an indication of each server in the array of servers, for determining a path to use for a connection between the KVM and a server, for configuring the cross connect to provide the path based on information provided by the node operating systems of other switch nodes in the network of switch nodes, and for requesting other switch nodes to configure their respective cross connects to provide the path determined by the node operating system; and an internode link port, for providing a network connection enabling communication between the node operating system of the switch node and operating system of other switch nodes in the array of switch nodes, the internode link being the connection through which the switch node learns of available connections to servers and available connections between switch nodes.

**3 Claims, 4 Drawing Sheets**



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access, the node operating system 31 determines a connection path to use for the access. In case of a network of five or less hyper-switch nodes, in the preferred embodiment of four expansion ports, a direct path might be available for any service i.e. a path through only a single additional hyper-node switch 21'. If however, the direct path is not available or if there is no direct path, the node operating system 31 will determine another path. Each hyper-switch node 21 interrogates each other hyper-switch node it is directly connected to using the connections provided through the expansion ports 14. However, all other network information is acquired via the internode link 29, by querying each other hyper-switch node 21' 21" 21'" 21"" in the network whenever such other information is needed. Then, in hunting for a path for an indirect connection, the node operating system 31 performs a path hunt algorithm, using the current state of each connection in the network acquired through the interrogation, i.e. using the acquired knowledge about each individual connection.

In determining an indirect path, the node operating system interrogates one or more other node operating systems as to what connections are available. The interrogation prompts each interrogated switch node to provide what connections to attached servers are available, as well as what direct connections to other switch nodes are available. After performing the path hunt and so determining an indirect path, the node operating system configures not only its own cross connect 38, but also requests that other node operating systems configure their respective cross connects so as to provide each of the connections needed for the indirect path.

It is to be understood that the above-described arrangements are only illustrative of the application of the principles of the present invention. In particular, it is obvious that the present invention is not intended to be limited to an architecture in which there are in particular four expansion ports, two KVM ports, or twelve server ports. Although such a hyper-switch node is a good choice in a wide range of real world applications, a hyper-switch node having fewer or more expansion ports or KVM ports or server ports is also useful, depending on the application. The advantages of the present invention accrue as long as there are at least two expansion ports and at least two server ports, and at least one KVM port. Beside differences such as these, numerous other modifications and alternative arrangements from what is

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disclosed here may be devised by those skilled in the art without departing from the spirit and scope of the present invention, and the appended claims are intended to cover such modifications and arrangements.

What is claimed is:

1. A switch node among a plurality of nodes, for connecting a keyboard video mouse (KVM) combination and a server in an array of servers, each server attached to the switch node or attached to another switch node, all of the switch nodes constituting a network of interconnected switch nodes, the switch node comprising:

- a) a KVM port for providing a connection to an attached KVM;
- b) a plurality of server ports for providing connections to a plurality of attached servers;
- c) a plurality of expansion ports for providing connections to other switch nodes in the network of switch nodes;
- d) a cross connect, for providing connections between the KVM and one of the server ports or one of the expansion ports;
- e) a node operating system, for providing to a user of the KVM an indication of each server in the array of servers, for determining a path to use for a connection between the KVM and a server selected by the user, for configuring the cross connect to provide the path, for requesting others of the switch nodes to configure their respective cross connects so as to provide the path determined; and
- f) an internode link port, for providing a network connection enabling communication between the node operating system of the switch node and the node operating system of other switch nodes in the network of switch nodes.

2. A switch node as in claim 1, wherein the configuring of the cross connect to provide the path is based on information provided by the node operating systems of other switch nodes in the network of switch nodes.

3. A switch node as in claim 1, wherein the requesting of others of the switch nodes to configure their respective cross connects so as to provide the path determined is according to directions provided by the switch node.

\* \* \* \* \*

31/3,K/28 (Item 28 from file: 350)  
DIALOG(R)File 350:Derwent WPIX  
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015645021 \*\*Image available\*\*  
WPI Acc No: 2003-707204/200367  
XRPX Acc No: N03-564921

Dual processing system for personal computer , has internet and master  
computer systems each comprising individual basic input/output system  
and operating system that are segregated from each other

Patent Assignee: POLICARD C M (POLI-I)

Inventor: POLICARD C M

Number of Countries: 001 Number of Patents: 001

Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
US 6578140	B1	20030610	US 2000548824	A	20000413	200367 B

Priority Applications (No Type Date): US 2000548824 A 20000413

Patent Details:

Patent No	Kind	Lan Pg	Main IPC	Filing Notes
US 6578140	B1	10	G06F-012/14	

Dual processing system for personal computer , has internet and master  
computer systems each comprising individual basic input/output system  
and operating system that are segregated from...

Abstract (Basic):

... The processing system has an internet **computer** system and a  
master **computer** system each comprising a basic input/output system  
(BIOS), and an operating system. The BIOS and operating systems of the  
**computer** systems are segregated from each other. A key management  
infrastructure ( **KVM** ) **switch** (58) is provided so as to toggle  
between the segregated **computer** systems.

... 1) personal **computer** ; and...

...Dual processing system for use in personal **computer** (claimed), desktop  
**computer** , to segregate applications software from e-mail and internet  
download files for online banking, online...

...The corruption of application software in master **computer** due to virus  
in content downloaded from the internet is reliably prevented by  
segregating the BIOS and OS systems of the respective **computer**  
systems. The **KVM** **switch** enables the **computer** systems to share a  
common keyboard, video display device and mouse pointing device...

... **KVM** **switch** (58

...Title Terms: **COMPUTER** ;

International Patent Class (Main): **G06F-012/14**

International Patent Class (Additional): **G06F-011/30** ...

... **G06F-015/177**

Manual Codes (EPI/S-X): **T01-F05E** ...

... **T01-F05G**



US006578140B1

**(12) United States Patent  
Policard****(10) Patent No.: US 6,578,140 B1  
(45) Date of Patent: Jun. 10, 2003****(54) PERSONAL COMPUTER HAVING A  
MASTER COMPUTER SYSTEM AND AN  
INTERNET COMPUTER SYSTEM AND  
MONITORING A CONDITION OF SAID  
MASTER AND INTERNET COMPUTER  
SYSTEMS****(76) Inventor: Claude M Policard, 92-16 Whitney  
Ave., apt. #211, Elmont, NY (US)  
11373****(\*) Notice: Subject to any disclaimer, the term of this  
patent is extended or adjusted under 35  
U.S.C. 154(b) by 0 days.****(21) Appl. No.: 09/548,824****(22) Filed: Apr. 13, 2000****(51) Int. Cl.<sup>7</sup> ..... G06F 12/14; G06F 11/30;  
G06F 15/177****(52) U.S. Cl. .... 713/1; 713/200; 709/224;  
710/62****(58) Field of Search ..... 713/1, 2, 200,  
713/201; 714/1, 2, 6, 8, 10, 11; 700/2-4;  
709/208, 223, 224; 710/62, 8, 10****(56) References Cited****U.S. PATENT DOCUMENTS**

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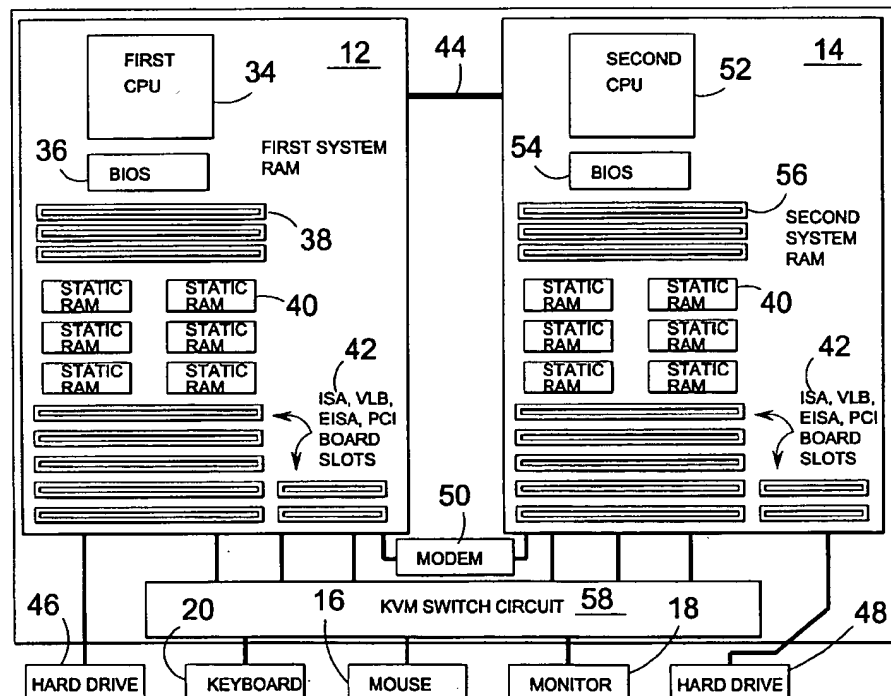
**FOREIGN PATENT DOCUMENTS**

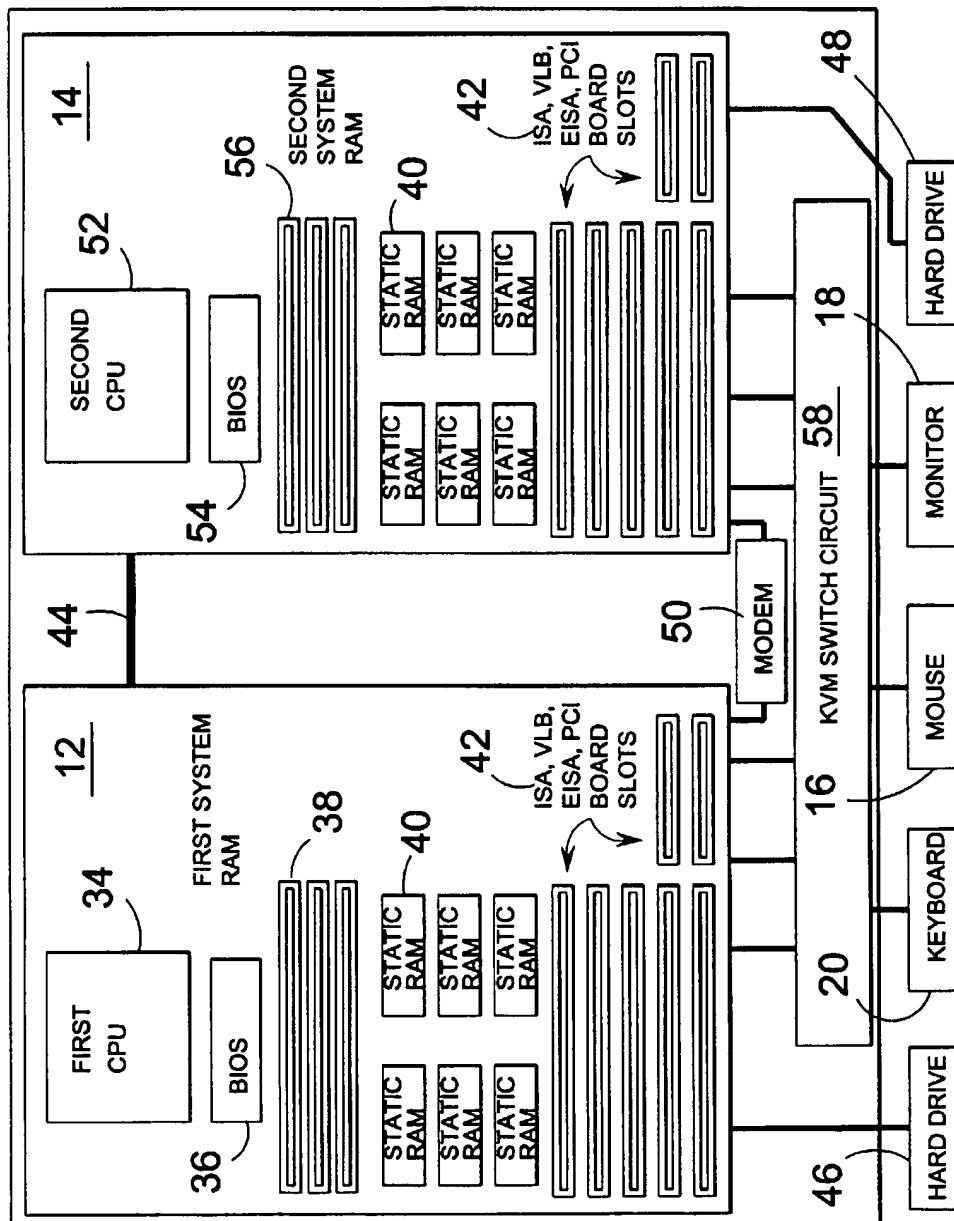
WO WO 00/63778 \* 10/2000

\* cited by examiner

*Primary Examiner—Jeffrey Gaffin**Assistant Examiner—Ilwoo Park**(74) Attorney, Agent, or Firm—Michael I. Kroll***(57) ABSTRACT**

The invention is desktop computers sharing components and having divergent operating systems, hard drive(s) and memory for the expressed purpose of segregating the day to day data processing functions and files from access to the Internet and downloading information and e-mail therefrom.

**11 Claims, 5 Drawing Sheets**

**FIG. 4**

system (32) has a second system board (14), second CPU (52) and second bios (54) which will be used as startup means for retrieving the operating system from a second disk drive (48). The second processor has one or more memory chip(s) (56) and can additionally have its own static ram (40) and controller board slots for ISA, VLB, EISA, or PCI devices (42). There is also shown an inter-processor bus (44).

Both of the processor systems (30, 32) share a modem (50). In addition the processors share monitor (18), keyboard (20) and mouse (16) by means of KVM switch circuit (58). This configuration will allow for segregation of application data processing from Internet communication functions. The system will boot two segregated operating systems each having a dedicated microprocessor, dedicated memory and one or more dedicated hard drives for each operating system.

Referring to FIG. 5, the first computer system (30) has a modem (50) for connection to the Internet. The system further has a first memory (38) and first disk drive (46) and first microprocessor (34). The operating system (60) of the first processor system (30) has control of the dual processor system (10) while said first processor system (30) is browsing the Internet. Should the anti-virus software encounter an unknown virus, then the first cpu (34) and/or first memory (38) and/or first disk drive (46) will segregate the virus from infecting the second processor system (32).

In addition, a third microprocessor (62) could be incorporated into the dual segregated operating system computer to monitor the condition of both the first processor system (30) and second processor system (32).

What is claimed is new and desired to be protected by Letters Patent is set forth in the appended claims:

1. A dual processing system made up of a master computer system and an internet computer system within a single personal computer for segregating applications software from e-mail and internet downloaded files, the system comprising:
  - a) means for storing a first bios and a first operating system in said master computer system;
  - b) means in said personal computer for executing said first bios and said first operating system;
  - c) means for storing a second bios and a second operating system in said internet computer system;
  - d) means in said personal computer for executing said second bios and said second operating system, said means for storing and executing said first bios and first operating system being segregated from said means for storing and executing said second bios and second operating system to prevent contamination of applications software in said master computer system by a computer virus downloaded from the internet by said internet computer system;
  - e) a single monitor, a keyboard and a mouse for use with both of said master and internet computer systems;
  - f) means for toggling between the segregated master and internet computer systems comprising a KVM switch circuit; and
  - g) means for monitoring a condition of said master and internet computer systems.

2. The system of claim 1, wherein said means for storing a first bios includes a first bios chip.

3. The system of claim 2, wherein said means for executing a first bios includes a first cpu.

4. The system of claim 3, wherein said means for storing a second bios includes a second bios chip.

5. The system of claim 4, wherein said means for executing a second bios includes a second cpu.

6. The system of claim 5, wherein said means for storing a first operating system includes a first disk drive.

7. The system of claim 6, wherein said means for executing a first operating system includes a first cpu.

8. The system of claim 7, wherein said means for storing a second operating system includes a second disk drive.

9. The system of claim 8, wherein said means for executing a second operating system includes a second cpu.

10. A personal computer containing a dual processing system for segregating applications software from e-mail and internet downloaded files comprising:

- a) a single case housing segregated master and internet computer systems, said systems being segregated to prevent contamination of applications software by a computer virus downloaded from the internet;
- b) said master computer system for processing and executing applications software comprising means for storing and executing a first bios, and means for storing and executing a first operating system including a dedicated microprocessor, memory and hard drive;
- c) said Internet computer system for downloading and processing files from the internet comprising means for storing and executing a second bios, and means for storing and executing a second operating system including a dedicated microprocessor, memory and hard drive; monitor, a keyboard and a mouse;
- e) means for toggling between the segregated master and internet computer systems comprising a KVM switch circuit; and
- f) means for monitoring a condition of said master and internet computer systems.

11. A method of preventing contamination of applications software by a computer virus from e-mail and internet downloaded files comprising the steps of:

- a) combining in said personal computer segregated master and internet computer systems, said master computer system comprising a first CPU, a first BIOS, a first hard drive and a first operating system, said internet computer system comprising a second CPU, a second BIOS, a second hard drive and a second operating system;
- b) connecting a monitor, a keyboard and a mouse for use with both of said master and internet computer systems;
- c) toggling between said master and internet computer systems using a KVM switch circuit for preventing the contamination of application software by a computer virus downloaded from the internet by said internet computer system; and
- d) monitoring by a third CPU a condition of said master and internet computer systems.

\* \* \* \* \*

31/3,K/31 (Item 31 from file: 350)  
DIALOG(R)File 350:Derwent WPIX  
(c) 2005 Thomson Derwent. All rts. reserv.

015523499 \*\*Image available\*\*  
WPI Acc No: 2003-585647/200355  
XRPX Acc No: N03-466248

**Signal switch for console and peripheral devices, has hub switch for communicating with computer and peripheral devices, and device controller for emulating console devices according to human interface device standard**

Patent Assignee: ATEN TECHNOLOGY INC (ATEN-N)  
Inventor: CHEN K; LOU T; YANG S  
Number of Countries: 103 Number of Patents: 007  
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
US 20030093599	A1	20030515	US 2001338071	P	20011109	200355 B
			US 200265375	A	20021010	
WO 200342844	A1	20030522	WO 2002US35771	A	20021106	200355
EP 1451696	A1	20040901	EP 2002789495	A	20021106	200457
			WO 2002US35771	A	20021106	
AU 2002352529	A1	20030526	AU 2002352529	A	20021106	200464
TW 589539	A	20040601	TW 2002123858	A	20021016	200482
JP 2005509947	W	20050414	WO 2002US35771	A	20021106	200527
			JP 2003544609	A	20021106	
CN 1602473	A	20050330	CN 2002824593	A	20021106	200547

Priority Applications (No Type Date): US 2001338071 P 20011109; US  
200265375 A 20021010

Patent Details:

Patent No	Kind	Lan Pg	Main IPC	Filing Notes
US 20030093599	A1	11	G06F-013/12	Provisional application US 2001338071

WO 200342844 A1 E G06F-013/00

Designated States (National): AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA  
CH CN CO CR CU CZ DE DK DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN  
IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ  
OM PH PL PT RO RU SD SE SG SI SK SL TJ TM TN TR TT TZ UA UG US UZ VC VN  
YU ZA ZM ZW

Designated States (Regional): AT BE BG CH CY CZ DE DK EA EE ES FI FR GB  
GH GM GR IE IT KE LS LU MC MW MZ NL OA PT SD SE SK SL SZ TR TZ UG ZM ZW

EP 1451696 A1 E G06F-013/00 Based on patent WO 200342844

Designated States (Regional): AL AT BE BG CH CY CZ DE DK EE ES FI FR GB  
GR IE IT LI LT LU LV MC MK NL PT RO SE SI SK TR

AU 2002352529 A1 G06F-013/00 Based on patent WO 200342844

TW 589539 A G06F-013/12

JP 2005509947 W 15 G06F-013/14 Based on patent WO 200342844

CN 1602473 A G06F-013/00

**Signal switch for console and peripheral devices, has hub switch for communicating with computer and peripheral devices, and device controller for emulating console devices according to human interface device...**

Abstract (Basic):

... A universal serial bus (USB) hub **switch** (32) connected to a  
**CPU** (30) communicates with **computers** and peripheral devices through  
ports (34,36). A USB device controller (38) emulates console devices  
such as keyboard connected to the **CPU** and hub **switch**, according to  
the human interface device (HID) standard. Host and video controllers  
(44,50) communicate with the **computer** and video monitor through ports

(48,52).

... For sharing video monitor, console devices such as keyboard and mouse, **computer** peripheral devices such as printer...

...Allows **computers** connected to the **switch** to share all USB peripheral devices. The **switch** can either asynchronously or synchronously **switch** the **keyboard - video - mouse (KVM)** channels and peripheral channels to a common **computer** or different **computer** without **interruption** of data flow to the peripheral device. Use of emulation makes the **switch** appear as a **computer** to peripheral devices, and enables it to communicate with the USB devices or USB PCs...

...The figure shows the block diagram of signal **switch** .

...

... CPU (30...

...USB hub **switch** (32

...Title Terms: **SWITCH** ;

International Patent Class (Main): **G06F-013/00** ...

... **G06F-013/12** ...

... **G06F-013/14**

International Patent Class (Additional): **G06F-003/00** ...

... **G06F-009/455** ...

... **G06F-013/10** ...

... **G06F-015/173**

Manual Codes (EPI/S-X): **T01-C07C4** ...

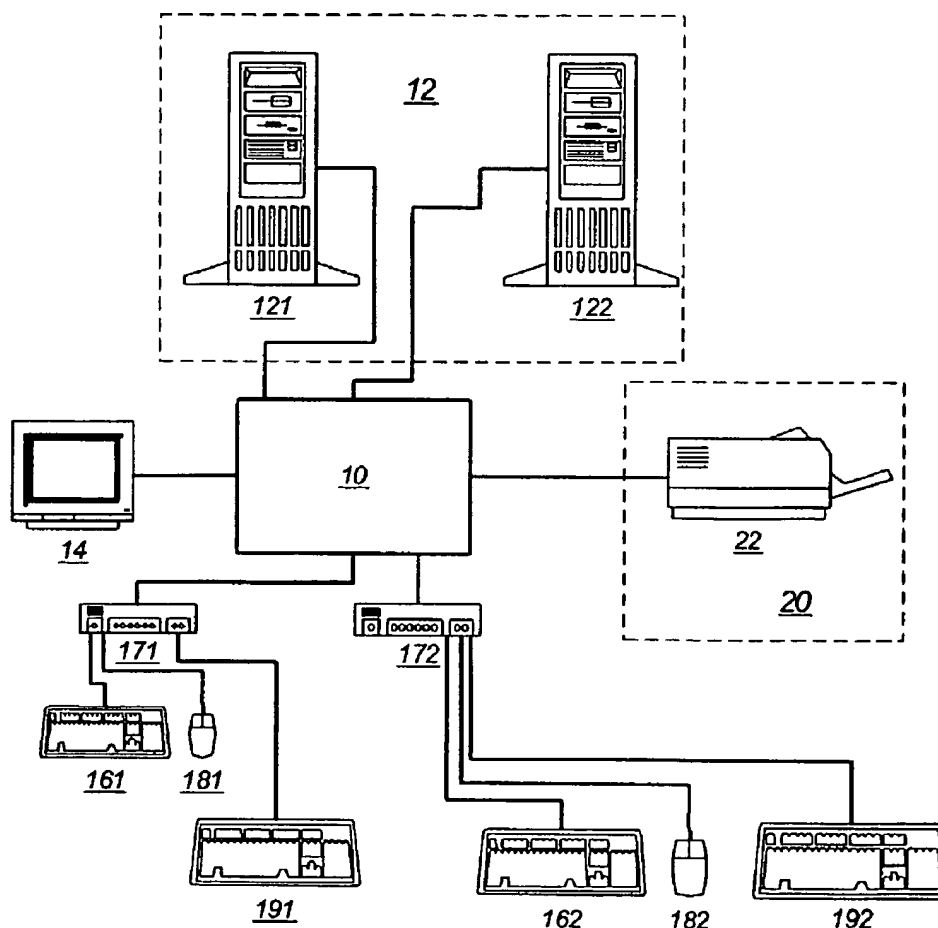


US 20030093599A1

(19) **United States**(12) **Patent Application Publication**(10) **Pub. No.: US 2003/0093599 A1****Lou et al.**(43) **Pub. Date:****May 15, 2003**(54) **SIGNAL SWITCH FOR CONSOLE AND PERIPHERAL DEVICES****Publication Classification**(51) **Int. Cl.<sup>7</sup>** ..... G06F 13/12(52) **U.S. Cl.** ..... 710/72(75) **Inventors:** Tony Lou, Shijr City (TW); Kevin Chen, Shijr City (TW); Sampson Yang, Irvine, CA (US)(57) **ABSTRACT**

Correspondence Address:  
**SHELDON & MAK, INC**  
**225 SOUTH LAKE AVENUE**  
**9TH FLOOR**  
**PASADENA, CA 91101 (US)**

A signal switch for sharing a video monitor, a plurality of console devices compliant with an industry standard and one or more than one peripheral device in any of a plurality of computer systems, is provided comprising a CPU with a first memory for storing a management program for managing the signal switch; a hub switch module connected to the CPU and configured to communicate with any of the plurality of computer systems, and the one or more than one peripheral device; a device control module for emulating according to the industry standard the plurality of console devices, connected to the CPU and the hub switch module; a host control module connected to the CPU and configured to communicate with the plurality of console devices; and a video control module connected to the CPU and configured to communicate with a video monitor device.

(73) **Assignee:** ATEN Technology, Inc., Irvine, CA (US)(21) **Appl. No.:** 10/065,375(22) **Filed:** Oct. 10, 2002**Related U.S. Application Data**(60) **Provisional application No. 60/338,071, filed on Nov. 9, 2001.**

31/3,K/44 (Item 44 from file: 350)  
DIALOG(R)File 350:Derwent WPIX  
(c) 2005 Thomson Derwent. All rts. reserv.

013606732 \*\*Image available\*\*  
WPI Acc No: 2001-090940/200110  
Related WPI Acc No: 2001-122710  
XRPX Acc No: N01-068937

Keyboard - video - mouse switch for multiple user, issues emulated  
mouse instructions to computer using one of user input structures of  
mice having highest ranking in predetermined hierarchical mouse ranking

Patent Assignee: CYBEX COMPUTER PROD CORP (CYBE-N); AVOCENT CORP (AVOC-N)  
Inventor: NICOLAS M M; REED D D; STAFFORD D H; THOMAS C L; NICOLAS M A  
Number of Countries: 090 Number of Patents: 003

Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
WO 200068929	A1	20001116	WO 2000US12378	A	20000508	200110 B
AU 200049892	A	20001121	AU 200049892	A	20000508	200112
US 6256014	B1	20010703	US 99132926	P	19990506	200140
			US 2000564794	A	20000505	

Priority Applications (No Type Date): US 2000564794 A 20000505; US 99132926  
P 19990506

Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
WO 200068929	A1	E	33	G09G-005/08	

Designated States (National): AE AL AM AT AU AZ BA BB BG BR BY CA CH CN  
CR CU CZ DE DK DM EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP  
KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX NO NZ PL PT RO RU SD SE  
SG SI SK SL TJ TM TR TT TZ UA UG UZ VN YU ZA ZW

Designated States (Regional): AT BE CH CY DE DK EA ES FI FR GB GH GM GR  
IE IT KE LS LU MC MW NL OA PT SD SE SL SZ TZ UG ZW

AU 200049892	A		G09G-005/08	Based on patent WO 200068929
US 6256014	B1		G09G-005/08	Provisional application US 99132926

Keyboard - video - mouse switch for multiple user, issues emulated  
mouse instructions to computer using one of user input structures of  
mice having highest ranking in predetermined hierarchical mouse

Abstract (Basic):

... A mouse service subroutine issues preset queries to mice  
(11C,12C) of **workstations** (11,12). Based on the response to the  
queries, a **switch** (13) identifies the corresponding user input  
structures of the mice. Emulated mouse instructions are issued to a  
selected **computer** (14) using one of the user input structure that has  
highest ranking in predetermined hierarchical...

... A **switch processor** in the **keyboard - video - mouse (KVM)**  
**switch** (13) routes data between **workstations** and the **computer**  
(14). One user port of the **switch** (13) receives signals from the  
mouse (11C) of the **workstation** (11) having an associated set of user  
input structures. Another user port receives signals from...

...For **multiple** -users for simultaneous access of any of a number of  
**computers** .

...The figure shows the perspective view of the **KVM switch** .

... **Workstations** (11,12...

... KVM switch (13...

... Computer (14

...Title Terms: SWITCH ;

International Patent Class (Additional): G06F-003/00

Manual Codes (EPI/S-X): T01-C ...

... T01-C02B1A



US006256014B1

(12) **United States Patent**  
**Thomas et al.**

(10) **Patent No.:** **US 6,256,014 B1**  
 (45) **Date of Patent:** **Jul. 3, 2001**

(54) **MOUSE RANKING SYSTEM FOR MULTIPLE USERS**

(75) **Inventors:** **Christopher L. Thomas, Madison;**  
**Douglas D. Reed, Meridianville; David**  
**H. Stafford; Mark M. Nicolas, both of**  
**Huntsville, all of AL (US)**

(73) **Assignee:** **Avocent Corporation, Huntsville, AL**  
**(US)**

(\*) **Notice:** Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) **Appl. No.:** **09/564,794**

(22) **Filed:** **May 5, 2000**

**Related U.S. Application Data**

(60) **Provisional application No. 60/132,926, filed on May 6, 1999.**

(51) **Int. Cl.<sup>7</sup>** ..... **G09G 5/08**

(52) **U.S. Cl.** ..... **345/163; 345/157; 710/131**

(58) **Field of Search** ..... **345/1, 157, 163,**  
**345/168, 167, 161; 710/1, 2, 36, 62, 131,**  
**244**

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\* cited by examiner

*Primary Examiner*—Richard Hjerpe

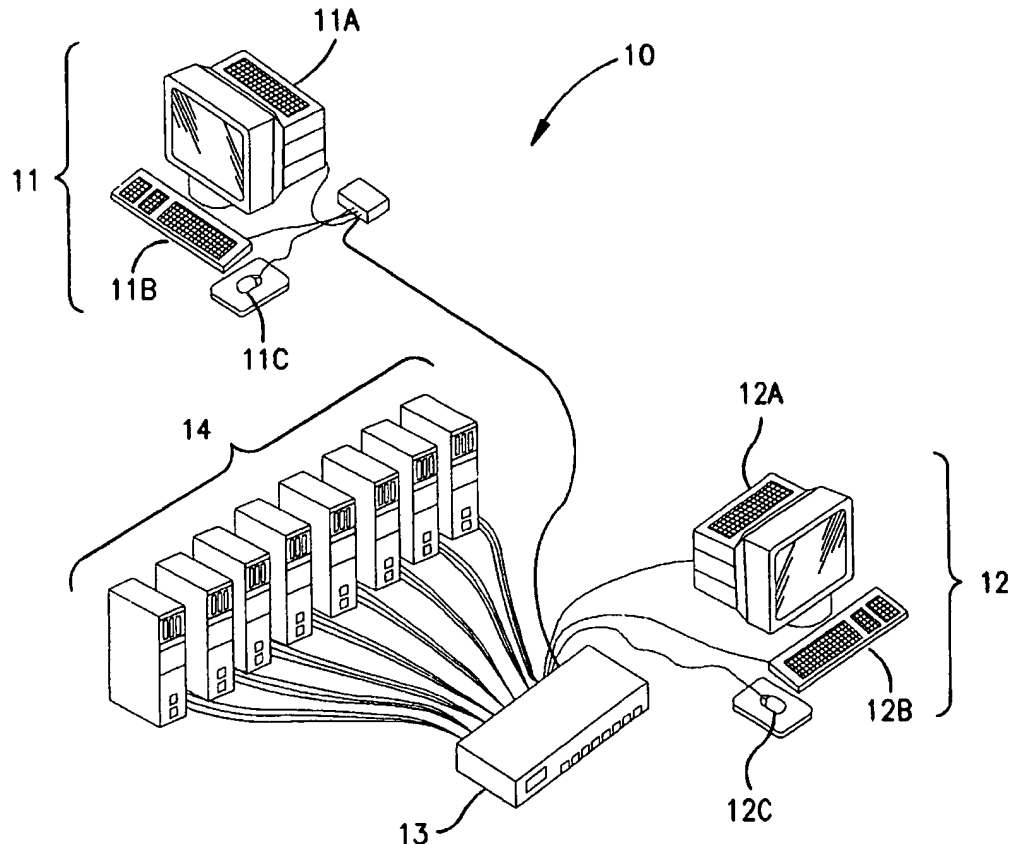
*Assistant Examiner*—Alexander Eisen

(74) *Attorney, Agent, or Firm*—Nixon & Vanderhye P.C.

(57) **ABSTRACT**

A multi-user KVM switch system is disclosed in which the KVM switch utilizes a pre-determined routine to determine which types of mice are connected to the KVM switch user ports. When the multiple mice communicate with a common computer via the KVM switch, the present invention provides a hierarchical mouse ranking structure which the KVM switch 13 uses to determine which of the disparate mouse driver types the KVM switch will emulate to the commonly selected computer. In this manner, disparate mouse types speaking to a common KVM switch and to a commonly selected computer by a mouse emulation type which is advantageously selected from a hierarchical ranking of mouse types in flash memory of the KVM switch.

**16 Claims, 6 Drawing Sheets**



31/3,K/43 (Item 43 from file: 350)  
DIALOG(R)File 350:Derwent WPIX  
(c) 2005 Thomson Derwent. All rts. reserv.

013638502 \*\*Image available\*\*  
WPI Acc No: 2001-122710/200113  
Related WPI Acc No: 2001-090940  
XRPX Acc No: N01-090145

Keyboard - video - mouse switch for switching between computers ,  
has hardware components with one microprocessor and two or more  
workstation ports and software module with computer interface  
interrupt service routine

Patent Assignee: CYBEX COMPUTER PROD CORP (CYBE-N); AVOCENT CORP (AVOC-N)

Inventor: KIRSHTEN P M; REED D D; STAFFORD D H; THOMAS C L

Number of Countries: 091 Number of Patents: 004

Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
WO 200068813	A1	20001116	WO 2000US12379	A	20000508	200113 B
AU 200049893	A	20001121	AU 200049893	A	20000508	200113
EP 1183614	A1	20020306	EP 2000932122	A	20000508	200224
			WO 2000US12379	A	20000508	
US 6671756	B1	20031230	US 99132926	P	19990506	200402
			US 2000564793	A	20000505	

Priority Applications (No Type Date): US 2000564793 A 20000505; US 99132926  
P 19990506

Patent Details:

Patent No Kind Lan Pg Main IPC Filing Notes

WO 200068813 A1 E 81 G06F-015/16

Designated States (National): AE AL AM AT AU AZ BA BB BG BR BY CA CH CN  
CR CU CZ DE DK DM EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP  
KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX NO NZ PL PT RO RU SD SE  
SG SI SK SL TJ TM TR TT TZ UA UG UZ VN YU ZA ZW

Designated States (Regional): AT BE CH CY DE DK EA ES FI FR GB GH GM GR  
IE IT KE LS LU MC MW NL OA PT SD SE SL SZ TZ UG ZW

AU 200049893 A Based on patent WO 200068813

EP 1183614 A1 E G06F-015/16 Based on patent WO 200068813

Designated States (Regional): AL AT BE CH CY DE DK ES FI FR GB GR IE IT  
LI LT LU LV MC MK NL PT RO SE SI

US 6671756 B1 G06F-013/10 Provisional application US 99132926

Keyboard - video - mouse switch for switching between computers ,  
has hardware components with one microprocessor and two or more  
workstation ports and software module with computer interface  
interrupt service routine

Abstract (Basic):

... The switch includes hardware components comprising a single  
microprocessor , computer ports, computer input-output interface  
and workstation ports. The software module includes user interface  
module , user interface interrupt service routine, computer  
interface module and computer interface interrupt service  
routine.

... An INDEPENDENT CLAIM is also included for workstation  
switching method...

...For switching between workstations .

...

...The keyboard - video - mouse ( KVM ) switch is characterized by a  
single KVM processor and thus processing efficiency is improved

...Title Terms: **SWITCH** ;  
International Patent Class (Main): **G06F-013/10** ...

... **G06F-015/16**



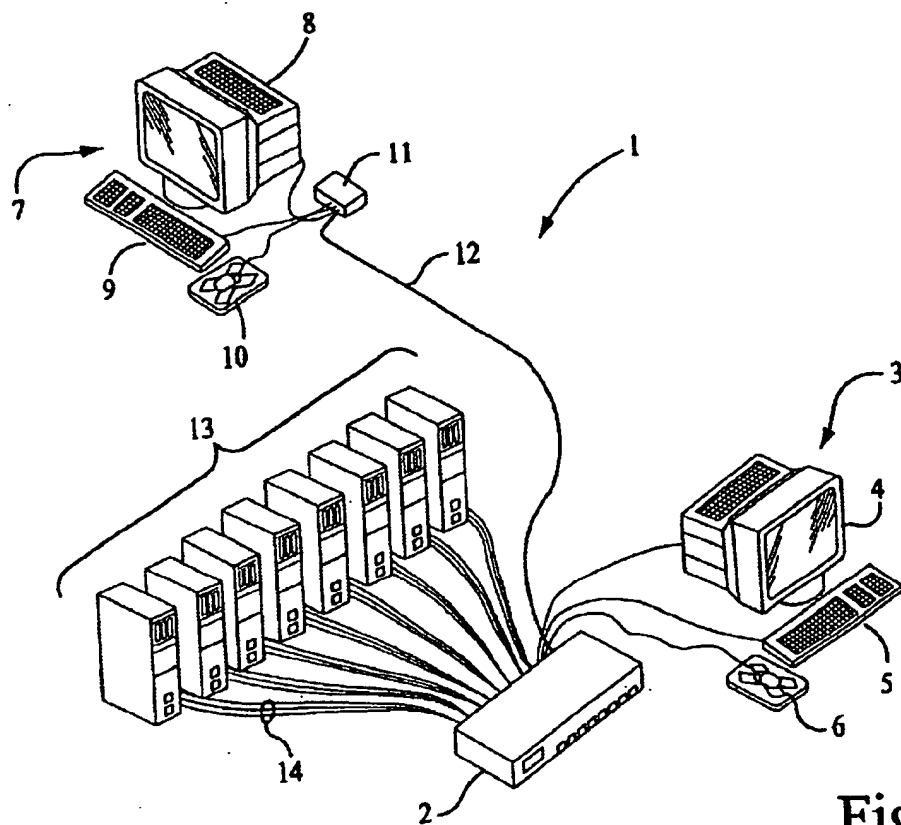


Fig. 1

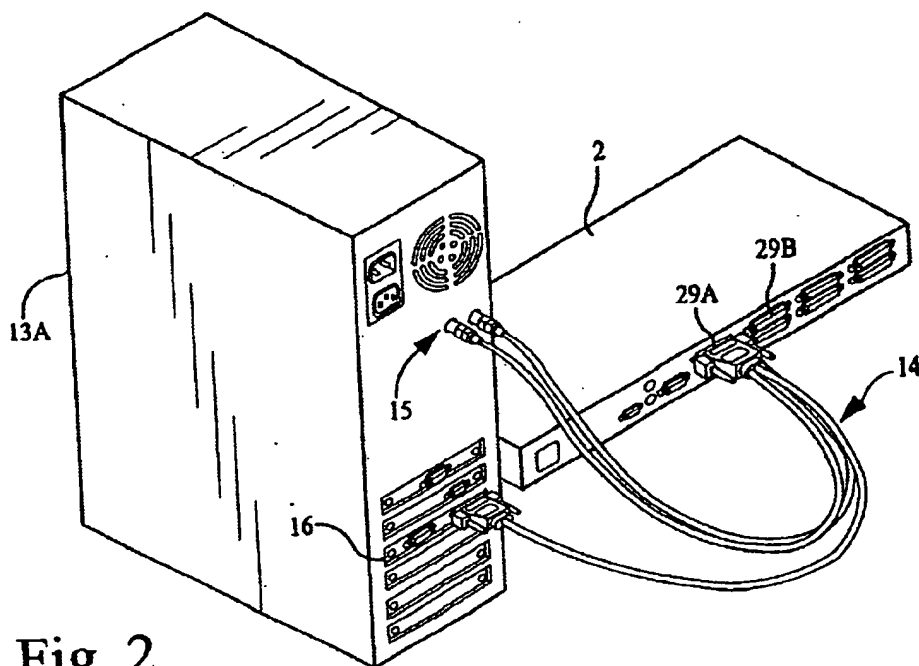


Fig. 2

the menu subsystem 74 to use the computer provided syncs (separate H & V, no composite) OR use syncs generated by the on board FPGA 77 (see element 43 of FIG. 8) as the source for the OSD. FIG. 13 illustrates horizontal sync processing by way of example.

The processor 38 provides timers (see FIG. 9) that are employed for the Vertical Sync Counter and Horizontal Sync Counter.

At least once per second, the video sync handler will execute a state machine 70 that will count the number of horizontal sync pulses between two vertical sync pulses. The vertical sync counter will use a short ISR to start/stop the horizontal sync counter accordingly. The number of horizontal sync pulses taken during the most recent measurement cycle will be available to the menu subsystem. Syncs from the computers 13 are received by dual muxes 71 and 72 and placed on local and remote user sync buses. Local and remote muxes 68 and 69 will take syncs from either the sync buses (from the computers) or from the sync generation 43 for application to the local and remote monitors 4/8.

Since the present switch accommodate multiple users, the OSD system must handle switch commands from all users. A channel switching module processes reception of action requests from multiple users to switch channels from various sources such as pushbutton, hot key sequences, scanning and the OSD menu. FIG. 17 illustrates such a module.

In FIG. 17, the goal is to keep the various subsystems such as the Hot Key Handler etc. separate from each other, and from the switching Handler. A bulletin board type mentality will be used so that any module/handler external to the switching handler 97 can post an action request on the switching handler bulletin board via API 96. The Switching Handler, called by the main task loop, checks the bulletin board for any action requests that may be posted. The action request will consist of at least the user number submitting the request and the desired destination channel.

Each switch unit, whether base or tiered, will be responsible for tracking both user paths within that unit. In other words, each unit must know which PC is currently selected by which set of peripherals, local or remote.

A Serial Port Module may also be employed to handle the serial port I/O on the switch box, including applications such as OSD utilities, "Power Commander" utilities offered commercially by Cyberg Computer Products, Corp, etc. FIG. 16 illustrates the serial port 89, interrupt service routine 88, handler 87, and API 86 interfacing with example utilities such as the OSD utility 84 and Power Commander 85. The Serial Port Module provides a mechanism for various applications to use and communicate with the external Serial Port (DB9). Serial port data is transmitted and received via interrupts.

In an alternative embodiment of the tiered (cascaded) structure of FIG. 6, the present switches include a method to detect the attachment of another switch product. This method was founded on the use of the Read ID keyboard command. Referencing FIG. 18, according to the IBM Keyboard Specification, the standard response to the Read ID Keyboard command is a constant 16 bit value (0x83AB). Previously, it was believed that all keyboards responded to the Read ID consistently to the point that KVM switch products did not issue the Red ID command but instead emulated the known response to the associated computer. This behavior was exploited by developing switch products to respond with a manufacturer ID (High Byte) and Product Code (Low Byte) in response to the third consecutive Read ID command.

Overall, the approach worked well except that some PCs (for example, the IBM 9585 and the IBM 300XL) also issue

3 consecutive Read ID commands in their boot sequence. Thus, prior KVM switches using the 3 Read ID command technique sometimes incorrectly determined itself to be attached to another like KVM switch product when only a PC was attached. The number of Read ID commands issued is increased to 10, as shown in FIG. 18. The greatest number of Read ID commands that are known to have been issued by a PC is 5 by the IBM 9585.

In an effort to reduce the communication traffic between KVM switch boxes, a shorthand protocol can be implemented to allow the Base box to communicate with the Tiered box with small overhead. Such a shorthand can employ a tiered protocol that consists of a prefix byte followed by a command byte. The command byte will instruct the Tiered unit to perform various tasks such as channel switches. Additional prefix bytes can be used to enhance the tiered protocol.

As previously described, the present invention also employs flash memory upgrading. Presently, Rose Electronics of Houston is believed to offer flash upgrading in a KVM switch called Ultraview, which is believed to provide the user two methods of flash upgrading:

- 1) using terminal program (like Hyperterminal) to send an ASCII text file, with the terminal screen used to update the user on the progress;
- 2) using file copy to send an ASCII text file, with LEDs used to update the user on the progress.

A problem with those methods is that the user interfaces are inadequate to monitor the file transfer. Further, there is no data flow control implemented which means menu data can be lost on the dump due to slow communication linking or bus overloading. Compounding the problem, the user interface's inadequacy leaves the user without good feedback that a data dump was unsuccessful and why.

In a first alternative embodiment of FIG. 21, flash downloading, a Terminal Program is employed such as (ProComm, Hyperterminal, etc.) using ASCII file transfer for the PC but with ASCII file transfer support developed on the embedded side. Such support can be either an Xmodem protocol or a slowed baud rate. Alternatively, the Terminal Program can be employed with the processor 38 having a dedicated flash download mode (see element 47 of FIG. 9) that will not be overloaded by a flash download.

In a second alternative embodiment, a DOS based utility is provided for PC download. This improves the user interface and has integrated flow control.

In a third alternative embodiment, a Custom Windows application is provided for PC download. This provides the most user-friendly, simple GUI for integrated flow control.

In any case, to program the on-chip Flash memory of the processor 38, a bootstrap loader (BSL) loads the flash programming routines and the program code via serial interface to the KVM switch. The flash programming routines and programming code then control future flash upgrading via the embodiment of FIG. 21.

While the invention has been described in connection with what is presently considered to be the most practical and preferred embodiment, it is to be understood that the invention is not to be limited to the disclosed embodiment, but on the contrary, is intended to cover various modifications and equivalent arrangements included within the spirit and scope of the appended claims.

What is claimed is:

1. A KVM switch, including:

hardware components, including:

- two or more computer ports to respectively link to two or more computers at keyboard, mouse and video ports of each of said computers;

## 25

a computer I/O interface to interface keyboard, mouse and video data with each of said computer ports;  
 a single microprocessor communicating with the computer I/O interface; and  
 two or more workstation ports to respectively link to two or more workstations each having a keyboard, mouse and video monitor, said workstation ports communicating with the single microprocessor; and software modules, including:

- a user interface module to give and receive keyboard, mouse, and video data to and from the workstation ports under the control of the single microprocessor;
- a user interface interrupt service routine to precipitate the transfer of said keyboard, mouse and video data to and from the workstation ports via interrupts on assigned lines of the workstation ports;
- a computer interface module to give and receive keyboard, mouse and video data to and from the computer ports under the control of the same single microprocessor; and
- a computer interface interrupt service routine to precipitate the transfer of said keyboard, mouse and video data to and from the computer ports and computer I/O via timer-based interrupts on assigned lines of the computer ports,

wherein the computer interface interrupt service routine polls each of the assigned lines of the computer ports on a periodic basis.

2. A KVM switch according to claim 1, further including:  
 a data extender interfaced between at least one of the workstation ports and at least one corresponding workstation.

3. A switch as in claim 1 wherein the single microprocessor further includes flash memory.

4. A switch as in claim 1 wherein the software modules further include:

- an on-screen display module to generate on-screen display menus in accordance with an on-screen display configuration.

5. A switch as in claim 4, wherein the single microprocessor further includes flash memory and the on-screen display configuration is stored in the flash memory.

6. A switch as in claim 5, wherein the hardware further includes a serial port and the software modules further include a serial port interface module to precipitate a transfer of new on-screen display configuration data to the flash memory.

7. A switch as in claim 1, wherein the hardware further includes a video subsystem to receive video signals from the computer ports and deliver the video signals to single microprocessor for delivery to selected ones of the workstation ports.

8. A switch as in claim 7, wherein the hardware further includes an on-screen display subsystem, in communication with the video subsystem, to generate on-screen menu signals, said video subsystem generating monitor video signals having a combination of said video signals from the computer ports and the on-screen menu signals for delivery to the selected ones of the workstation ports.

9. A switch as in claim 8, wherein the software further includes an on-screen display module to control generation of the on-screen menu signals by the on-screen display subsystem.

10. A switch as in claim 8, wherein the hardware further includes an internal sync generator, and wherein the video subsystem selects a sync signal from either the internal sync generator or from the video signals received from the computer ports.

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11. A method of switching keyboard, mouse and video data between multiple computers and multiple workstations, comprising:

- providing computer-side ports, one port for each of the computers;
- selecting some of the computers for communication with some of the multiple workstations;
- bi-directionally communicating the keyboard, mouse and video data between the some selected computers via corresponding ones of the computer-side ports and a single microprocessor under the control of a computer-side interrupt service routine that continuously polls the computer-side ports;
- translating the keyboard, mouse and video data into one or more protocols suitable for, respectively, the some selected workstations;
- providing peripheral-side ports, one port for each of the workstations;
- bi-directionally communicating the keyboard, mouse and video data between the some selected workstations via corresponding ones of the peripheral-side ports and the single microprocessor under the control of a peripheral-side interrupt service routine.

12. A method of communicating data between at least two computers and at least two computer workstations, comprising:

- providing first and second workstation ports communicating with, respectively, first and second ones of the computer workstations;
- providing first and second computer ports communicating with, respectively, first and second ones of the computers;
- using a single microprocessor, continuously polling the first and second workstation ports, via an interrupt service routine, to correspondingly retrieve and provide current keyboard, mouse and video data to and from, respectively, the first and second workstations via corresponding ones of the first and second workstation ports;
- using the same single microprocessor, continuously polling the first and second computer ports, via another interrupt service routine, to retrieve and provide the current keyboard, mouse and video data to and from a selected one of the at least two computers via a corresponding one of the first and second computer ports.

13. A method as in claim 12, further including:

- receiving the current keyboard data from the first workstation according to a first keyboard protocol suitable for the first workstation and translating that current keyboard data into a second keyboard protocol suitable for the selected computer; and
- receiving the current keyboard data from the selected computer according to the second keyboard protocol suitable for the selected computer and translating that current keyboard data into the first keyboard protocol suitable for the first workstation.

14. A method as in claim 12 further including:

- receiving the current mouse data from the first workstation according to a first mouse protocol suitable for the first workstation and translating that current mouse data into a second mouse protocol suitable for the selected computer; and
- receiving the current mouse data from the selected computer according to the second mouse protocol suitable for the selected computer and translating that current

31/3,K/34 (Item 34 from file: 350)  
DIALOG(R)File 350:Derwent WPIX  
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015437194 \*\*Image available\*\*  
WPI Acc No: 2003-499336/200347  
XRPX Acc No: N03-397166

Keyboard -video display-mouse switch for computer , transmits data  
input through input/output device to corresponding computer based on  
the judgment whether data is to be transmitted to master or slave switch

Patent Assignee: FUJITSU COMPONENT KK (FUJI-N)  
Number of Countries: 001 Number of Patents: 001  
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
JP 2003163673	A	20030606	JP 2001358301	A	20011122	200347 B

Priority Applications (No Type Date): JP 2001358301 A 20011122

Patent Details:

Patent No	Kind	Lan Pg	Main IPC	Filing Notes
JP 2003163673	A	18	H04L-012/44	

Keyboard -video display-mouse switch for computer , transmits data  
input through input/output device to corresponding computer based on  
the judgment whether data is to be transmitted to master or slave switch

Abstract (Basic):

... The keyboard - video display- mouse ( KVM ) switch  
(52,54,56,58,60) connected by dairy chain connection system, are  
connected to several computers . When data is input through  
input/output (I/O) device (50), a judgment unit judges whether the  
input data is to be transmitted to the master or slave switch , and  
accordingly transmits to respective computer .  
... 1) computer change method; and...

...2) computer change system...

... Keyboard - video display- mouse ( KVM ) switch for computers  
connected in network...

...Automatically transfers the input data from input-output device to  
respective destination computer terminal, based on the judgment  
result...

...The figure shows the block diagram keyboard - video display- mouse ( KVM ) switch connected to input/output device and computer .  
(Drawing includes non-English language text

...Title Terms: SWITCH ;

International Patent Class (Additional): G06F-003/00

Manual Codes (EPI/S-X): T01-C ...

- 44…マウス
- 46…キーボード
- 50、80…入出力装置
- 52…マスタ
- 54、56、58…中間スレーブ
- 60…最終スレーブ
- 64、66…ドライバ
- 68、70…レシーバ

72、82…マスタ  
74…スレーブm  
76…スレーブn  
78…スレーブ1  
84、86、88、90、92、94、96、98…ス  
レーブ  
100、102…コンピュータ

【図 1】

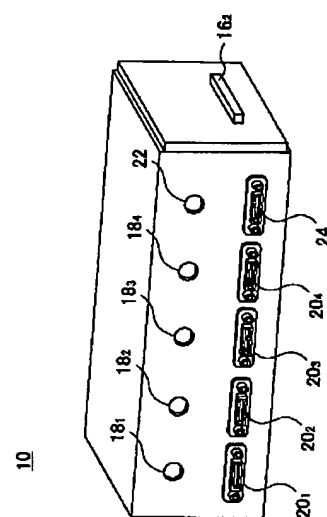
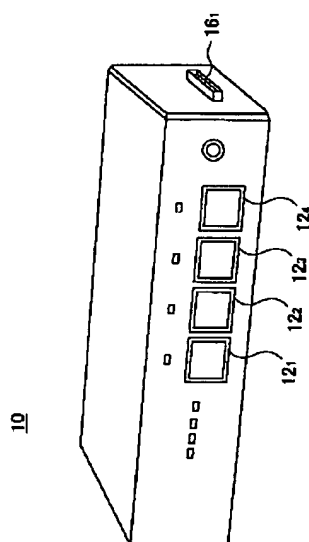
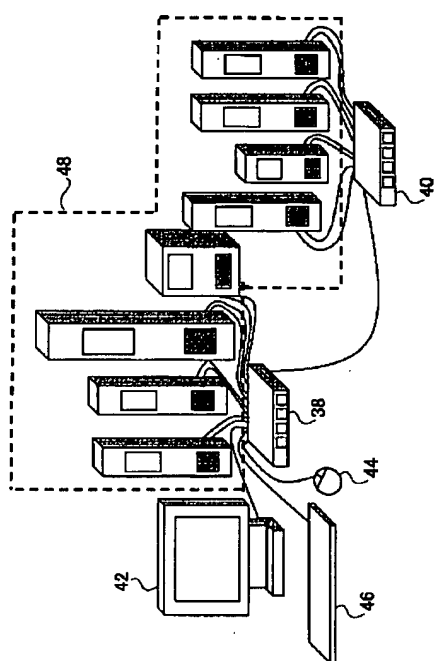
【図2】

【図3】

KVMスイッチにより複数の端末を接続した様子を示す図

### KVMスイッチの斜視図

### KVMスイッチの背面からの斜視図

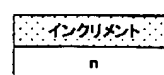
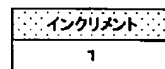


【图9】

【図10】

### インクリメントMSGを示す図

インクリメントMSGを示す図



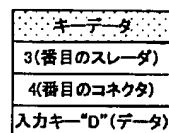
【図15】

スレーブ台数確認応答MSGを示す図



【图 16】

キーデータMSGを示す図



【図7】

【図8】

### MSGフォーマットを示す図

スレーブ台数確認コマンドMSGを示す図

コマンド名
パラメータ1
パラメータ2
...
パラメータn

スレーブ台数確認

【图 14】

スレーブ台数確認コマンドMSGを示す図

スレーブ台数確認	
n	

【図13】

スレーブ台数確認コマンドMSGを示す図

スレーブ台数確認
1

31/3,K/35 (Item 35 from file: 350)  
DIALOG(R)File 350:Derwent WPIX  
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015280306 \*\*Image available\*\*  
WPI Acc No: 2003-341237/200332  
XRPX Acc No: N03-272944

**Peripheral sharing switch e.g. keyboard , video and mouse switch  
, has clipboard memory**

Patent Assignee: GOUGH C D (Goug-I); INTEL CORP (ITLC )

Inventor: GOUGH C D

Number of Countries: 001 Number of Patents: 002

Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
US 20030005186	A1	20030102	US 2001895677	A	20010629	200332 B
US 6901455	B2	20050531	US 2001895677	A	20010629	200536

Priority Applications (No Type Date): US 2001895677 A 20010629

Patent Details:

Patent No	Kind	Lan Pg	Main IPC	Filing Notes
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US 20030005186	A1	7	G06F-003/00	
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US 6901455	B2		G06F-003/00	
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**Peripheral sharing switch e.g. keyboard , video and mouse switch  
, has clipboard memory**

Abstract (Basic):

... The **switching** system (100) has an unified clipboard memory  
(112) for storing data from a selected **computer** and to transfer the  
data to any other **computer** .

... is included for method of transferring data from a selected  
system to another through the **switching** system...

...For connecting peripherals such as keyboard, mouse and monitor to  
**multiple computers** for sharing them between the **computers** .

...No network connection or direct connection between the **computers** is  
required. The data transfer and sharing is faster

Technology Focus:

... The keyboard and mouse connection interfaces in the **switching**  
system include a serial interface recommended standard RS232 of  
Electronic Industries Association, PS/2 and...

...Title Terms: **SWITCH** ;

International Patent Class (Main): **G06F-003/00**

Manual Codes (EPI/S-X): **T01-C02A** ...

... **T01-C02B** ...

... **T01-C07C4**



US006901455B2

(12) **United States Patent**  
**Gough**

(10) **Patent No.:** **US 6,901,455 B2**  
(45) **Date of Patent:** **May 31, 2005**

(54) **PERIPHERAL SHARING DEVICE WITH  
UNIFIED CLIPBOARD MEMORY**

(75) **Inventor:** **Corey D. Gough**, Portland, OR (US)

(73) **Assignee:** **Intel Corporation**, Santa Clara, CA (US)

(\*) **Notice:** Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 148 days.

(21) **Appl. No.:** **09/895,677**

(22) **Filed:** **Jun. 29, 2001**

(65) **Prior Publication Data**

US 2003/0005186 A1 Jan. 2, 2003

(51) **Int. Cl.<sup>7</sup>** ..... **G06F 3/00**

(52) **U.S. Cl.** ..... **710/8; 710/15; 710/22;  
710/38; 370/392; 370/395**

(58) **Field of Search** ..... **710/8, 22, 38,  
710/15; 370/392, 395**

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\* cited by examiner

*Primary Examiner*—Jeffrey Gaffin

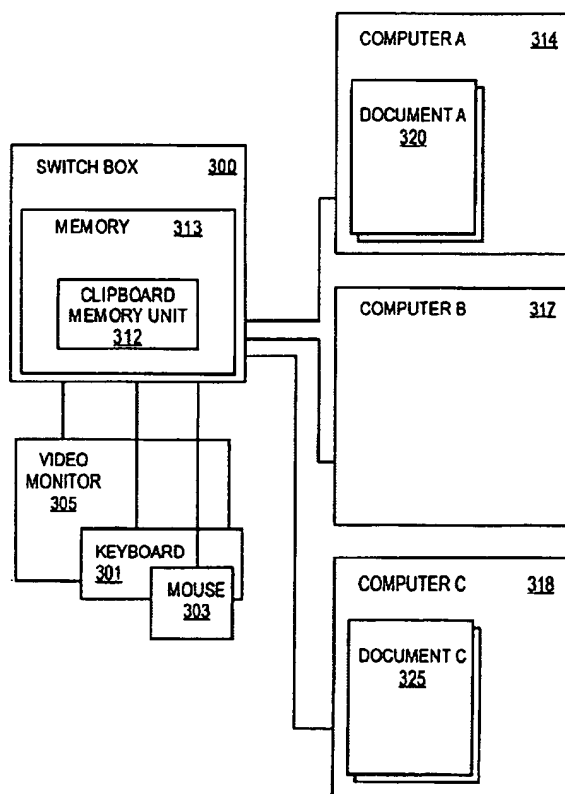
*Assistant Examiner*—Niketa Patel

(74) *Attorney, Agent, or Firm*—Sharmini N. Green

(57) **ABSTRACT**

A method and apparatus for implementing unified clipboard memory within a keyboard, video and mouse (KVM) switch device is described. The device enables a selected one of several associated computers to read and write from the unified memory inside a KVM switch. A user can share and transfer data quickly between computers even without a network connection or direct connection between the computers.

**17 Claims, 3 Drawing Sheets**



31/3,K/38 (Item 38 from file: 350)  
DIALOG(R)File 350:Derwent WPIX  
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014910870 \*\*Image available\*\*  
WPI Acc No: 2002-731576/200279  
XRPX Acc No: N02-576735

Computer system has switching system which selectively connects one of the CPU cards to servicing I/O bus for sending or receiving servicing I/O data to or from external device connected port  
Patent Assignee: XINHAN COMPUTER CO LTD (XINH-N); NEXCOM INT CO LTD (NEXC-N); CHEN H (CHEN-I); LIU H (LIUH-I)

Inventor: CHEN X; LIU H; CHEN H  
Number of Countries: 003 Number of Patents: 003  
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
US 20020124121	A1	20020905	US 2001797672	A	20010305	200279 B
CN 1384443	A	20021211	CN 2002106664	A	20020305	200324
TW 522330	A	20030301	TW 2001127188	A	20011101	200365

Priority Applications (No Type Date): US 2001797672 A 20010305

Patent Details:

Patent No	Kind	Lan Pg	Main IPC	Filing Notes
US 20020124121	A1	8	G06F-013/14	
CN 1384443	A		G06F-015/00	
TW 522330	A		G06F-003/00	

Computer system has switching system which selectively connects one of the CPU cards to servicing I/O bus for sending or receiving servicing I/O data to...

Abstract (Basic):

... Several CPU cards (102) are plugged into a backplane (104) having a servicing input/output (I/O) bus (108). A servicing control system (106) has an I/O interface module (114) electrically connected to the bus which has an external device connecting port. The system (106) has a switching system (112) which selectively connects one of the CPU card to the I/O bus, so as to send or receive servicing I/O ...  
Computer system including I/O interface module such as CD-ROM, floppy disk drive, keyboard port, video port and mouse port...

...The CPU cards share the common I/O interface module through the servicing I/O bus. Therefore, no cable is needed for signal transmissions, thereby...

...The figure shows a side view of the computer system...

... CPU card (102...

... Switching system (112...  
...I/O interface module (114

Title Terms: COMPUTER ;

International Patent Class (Main): G06F-003/00 ...

... G06F-013/14 ...

... G06F-015/00

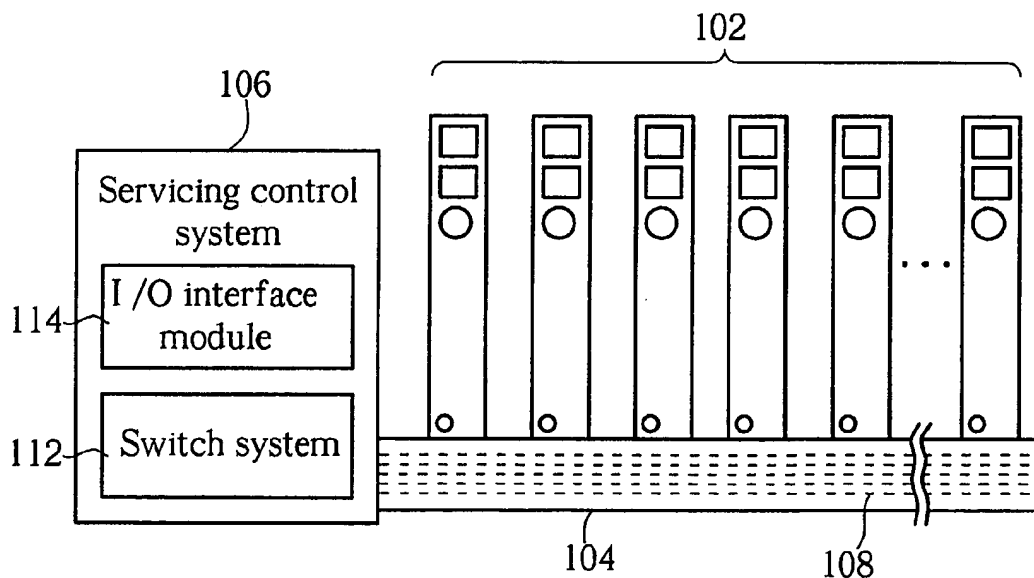
Manual Codes (EPI/S-X): T01-C07C5 ...



US 20020124121A1

(19) **United States**(12) **Patent Application Publication** (10) **Pub. No.: US 2002/0124121 A1****Chen et al.**(43) **Pub. Date:****Sep. 5, 2002**(54) **HIGH-DENSITY SYSTEM**(52) **U.S. Cl.** ..... **710/38**(76) **Inventors:** **Hsiang-Chan Chen, Taipei City (TW);**  
**Hung-I Liu, San-Chung City (TW)**(57) **ABSTRACT****Correspondence Address:****NAIPO (NORTH AMERICA**  
**INTERNATIONAL PATENT OFFICE)****P.O. BOX 506****MERRIFIELD, VA 22116 (US)**

A high-density system includes a backplane, a plurality of central processing unit (CPU) cards, and a servicing control system. The backplane has a servicing input/output (I/O) bus for carrying servicing I/O data. The central processing unit (CPU) cards are plugged into the backplane and connected to the servicing I/O bus. The servicing control system includes a switching system for selectively connecting only one of the CPU cards to the servicing I/O bus, and an I/O interface module electrically connected to the servicing I/O bus. The I/O interface module comprises at least a port to which an external device may be plugged. The servicing control system selectively enables only one of the CPU cards to send servicing I/O data to the port or to receive servicing I/O data from the port.

(21) **Appl. No.:** **09/797,672**(22) **Filed:** **Mar. 5, 2001****Publication Classification**(51) **Int. Cl.<sup>7</sup>** ..... **G06F 13/14**

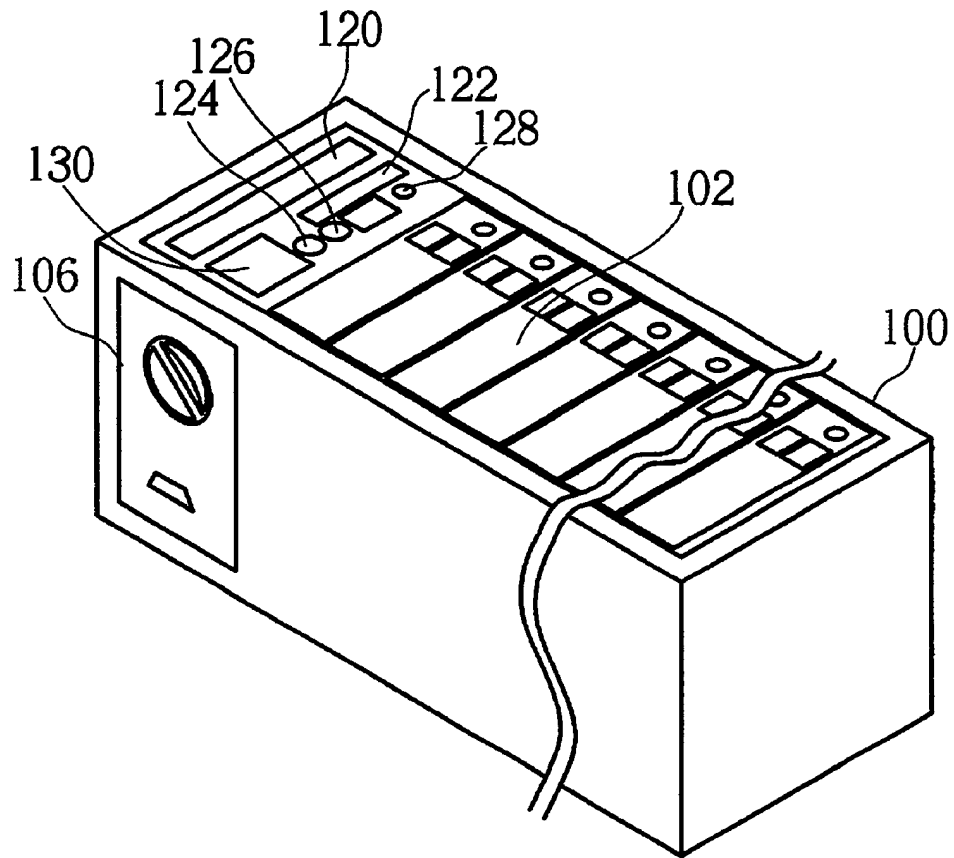


Fig. 2

## HIGH-DENSITY SYSTEM

### BACKGROUND OF THE INVENTION

#### [0001] 1. Field of the Invention

[0002] The present invention relates to a high-density system. More specifically, the present invention relates to a high-density system whose central processing unit cards share a common input/output (I/O) interface module through a servicing I/O bus.

#### [0003] 2. Description of the Prior Art

[0004] Please refer to FIG. 1. FIG. 1 is a block diagram of a prior art computer system 10. The computer system 10 comprises a backplane 14, a plurality of central processing unit (CPU) cards 12 plugged into the backplane 14, and a servicing control system 16. The servicing control system 16 comprises a plurality of input/output (I/O) ports including keyboard ports 22, video ports 24, and mouse ports 26. The servicing control system 16 further comprises a plurality of power switches 28 and a switching system 20 for selectively connecting only one of the CPU cards 12 to the input/output (I/O) ports on the servicing control system 16 by turning on only the power switch 28 corresponding to the selected CPU card 12. Each of the CPU cards 12 has a keyboard port 22, a video port 24 and a mouse port 26. The keyboard port 22, video port 24 and mouse port 26 of the CPU card 12 is connected to the corresponding I/O ports of the servicing control system 16 using cables 40.

[0005] As shown in FIG. 1, the keyboard port 22, video port 24 and mouse port 26 of each CPU card 12 are connected to the I/O ports of the servicing control system 16 using cables 40. The number of cables 40 will increase when more CPU cards 12 are plugged into the backplane 14, resulting in a great number of cables 40 and making the computer system 10 very messy.

### SUMMARY OF THE INVENTION

[0006] It is therefore a primary objective of this invention to provide a high-density system whose CPU cards share a common input/output (I/O) interface module through a servicing I/O bus to solve the above mentioned problem.

[0007] According to the claimed invention, the high-density system includes a backplane, a plurality of central processing unit (CPU) cards, and a servicing control system. The backplane has a servicing input/output (I/O) bus for carrying servicing I/O data. The central processing unit (CPU) cards are plugged into the backplane and capable of accepting data from the servicing I/O bus or sending data to the servicing I/O bus. The servicing control system includes a switching system for selectively connecting only one of the CPU cards to the servicing I/O bus, and an I/O interface module electrically connected to the servicing I/O bus. The I/O interface module comprises at least a port to which an external device may be plugged. The servicing control system selectively enables only one of the CPU cards to send servicing I/O data to the port or to receive servicing I/O data from the port.

[0008] It is an advantage of the present invention that the CPU cards of the high-density system share the common I/O interface module through the servicing I/O bus. Conse-

quently, space inside the high-density system is used efficiently and no cable is needed for signal transmissions.

[0009] These and other objectives and advantages of the present invention will no doubt become obvious to those of ordinary skill in the art after reading the following detailed description of the preferred embodiment that is illustrated in the various figures and drawings.

### BRIEF DESCRIPTION OF THE DRAWINGS

[0010] FIG. 1 is a block diagram of a prior art computer system.

[0011] FIG. 2 is a perspective view of a high-density system according to the present invention.

[0012] FIG. 3 is a side view of the high-density system in FIG. 2.

[0013] FIG. 4 is a data structure diagram of the high-density system in FIG. 2.

[0014] FIG. 5 is a functional block diagram of the high-density system in FIG. 2.

### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0015] Please refer to FIG. 2 and FIG. 3. FIG. 2 is a perspective view of a high-density system 100 according to the present invention. FIG. 3 is a side view of the high-density system 100. The high-density system 100 comprises a backplane 104 (as shown in FIG. 3), a plurality of central processing unit (CPU) cards 102, and a servicing control system 106. The backplane 104 has a servicing input/output (I/O) bus 108 set within the backplane 104 for carrying servicing I/O data 150 (FIG. 4). The servicing I/O data 150 comprises CFKVM data 134 and monitoring data 132. The CFKVM data 134 includes compact disk read only memory (CD-ROM) data, floppy disk drive (FDD) data, keyboard port data, video port data and mouse port data.

[0016] As shown in FIG. 2 and FIG. 3, the CPU cards 102 are plugged into the backplane 104, and can receive data from the servicing I/O bus 108 or transmit data to the servicing I/O bus 108. Further, the servicing control system 106 has a switching system 112 and an I/O interface module 114. The switching system 112 selectively connects only one of the CPU cards 102 to the servicing I/O bus 108 within the backplane 104 while the remaining CPU cards are switched off. The I/O interface module 114 comprises a CD-ROM 120, a floppy disk drive 122, a keyboard port 124, a video port 128, and a mouse port 126, which are electrically connected to the servicing I/O bus 108. Specifically, the I/O interface module 114 comprises at least a port to which an external device may be plugged. Generally, the servicing control system 106 selectively enables only one of the CPU cards 102 to transmit the servicing I/O data to the port or to receive the servicing I/O data from the port.

[0017] Please refer to FIG. 4. FIG. 4 is a data structure diagram of the high-density system 100. The servicing control system 106 further comprises a monitoring system 130 for generating monitoring data 132 through the servicing I/O bus 108. The monitoring data 132 includes information such as a rotational speed of a system fan 140, a system temperature 142, a system voltage 144 and the status of each of the CPU cards 102.

31/3,K/36 (Item 36 from file: 350)  
DIALOG(R)File 350:Derwent WPIX  
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015030964 \*\*Image available\*\*  
WPI Acc No: 2003-091481/200308  
XRPX Acc No: N03-072416

**Peripheral device signal processing system, converts native KVM signal from server into intermediate format for transmission over corresponding lines to interface port**

Patent Assignee: AVOCENT CORP (AVOC-N); KIRSHTEN P M (KIRS-I); ODRYNA V (ODRY-I); THOMAS C L (THOM-I)

Inventor: KIRSHTEN P M; ODRYNA V; THOMAS C L

Number of Countries: 101 Number of Patents: 005

Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
US 20020143996	A1	20021003	US 2001279461	P	20010329	200308 B
			US 2001951774	A	20010914	
WO 200280017	A1	20021010	WO 2002US9595	A	20020329	200308
EP 1388077	A1	20040211	EP 2002757837	A	20020329	200411
			WO 2002US9595	A	20020329	
AU 2002306935	A1	20021015	AU 2002306935	A	20020329	200432
JP 2004536377	W	20041202	JP 2002578172	A	20020329	200479
			WO 2002US9595	A	20020329	

Priority Applications (No Type Date): US 2001279461 P 20010329; US 2001951774 A 20010914

Patent Details:

Patent No	Kind	Lan Pg	Main IPC	Filing Notes
US 20020143996	A1	33	G06F-015/16	Provisional application US 2001279461

WO 200280017 A1 E G06F-015/16  
Designated States (National): AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU CZ DE DK DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ OM PH PL PT RO RU SD SE SG SI SK SL TJ TM TN TR TT TZ UA UG UZ VN YU ZA ZM ZW

Designated States (Regional): AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC MW MZ NL OA PT SD SE SL SZ TR TZ UG ZM ZW

EP 1388077 A1 E G06F-015/16 Based on patent WO 200280017

Designated States (Regional): AL AT BE CH CY DE DK ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT RO SE SI TR

AU 2002306935 A1 G06F-015/16 Based on patent WO 200280017

JP 2004536377 W 87 G06F-003/00 Based on patent WO 200280017

**Peripheral device signal processing system, converts native KVM signal from server into intermediate format for transmission over corresponding lines to interface port**

Abstract (Basic):

... A network interface unit has **several** network ports (142), **several** interface ports and a signal conditioner. The network ports communicate digitized KVM signals with remote user **workstations**. The conditioner converts the native KVM signals from respective **servers** (122) into an intermediate format for transmission over corresponding lines to interface port.

... 1) Video signals **switching** method...

...4) Video signal **switch**.

...

...processing signals from peripheral device such as keyboard, mouse, video

for transmission to remote user **workstations** .

...

...Provides an inexpensive way for **switching** **KVM** signals and provides flexibility in dealing with the management of **servers** .

...

... **Servers** (122

International Patent Class (Main): **G06F-003/00** ...

... **G06F-015/16**

International Patent Class (Additional): **G06F-003/02** ...

Manual Codes (EPI/S-X): **T01-C07C** ...

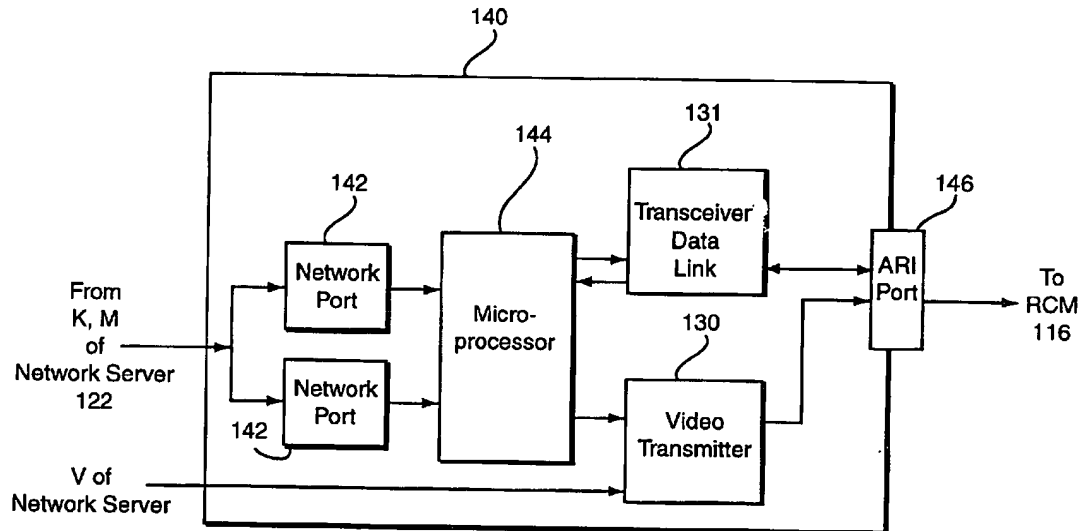


US 20020143996A1

(19) **United States**(12) **Patent Application Publication**  
**Odryna et al.**(10) **Pub. No.: US 2002/0143996 A1**(43) **Pub. Date: Oct. 3, 2002**(54) **PASSIVE VIDEO MULTIPLEXING METHOD  
AND APPARATUS PRIORITY TO PRIOR  
PROVISIONAL APPLICATION**(52) **U.S. Cl. .... 709/246; 710/62; 710/36**(76) **Inventors: Vic Odryna, Action, MA (US); Philip  
M. Kirshtein, New Market, AL (US);  
Christopher L. Thomas, Madison, AL  
(US)**(57) **ABSTRACT**

Correspondence Address:  
**NIXON & VANDERHYE P.C.**  
8th Floor  
1100 North Glebe Road  
Arlington, VA 22201 (US)

A passive video multiplexing method and apparatus for encoding video synchronization signals within a KVM extension system. A Rack Interface Pod (RIP) is provided for receiving video signals from a network server and providing them to a remote user via a local area network (LAN). The analog signals received by the RIP are transmitted to a Rack Connection Manager (RCM) having video processing logic, a supervisory processor, a KVM switch system, and Ethernet interface circuitry. A plurality of ARI systems are connected to the RCM, and a plurality of network servers, intended to be controlled by the remote user, are connected to each ARI by a respective wiring strip or Pod Expansion Module (PEM). The RCM performs selective switching by sourcing current through a pair of diodes associated with an active channel of the PEM while reverse biasing diodes associated with an inactive channel to select a network server among the plurality of network servers. Switching of video is accomplished without processing the video signals.

(21) **Appl. No.: 09/951,774**(22) **Filed: Sep. 14, 2001****Related U.S. Application Data**(60) **Provisional application No. 60/279,461, filed on Mar.  
29, 2001.****Publication Classification**(51) **Int. Cl.<sup>7</sup> ..... G06F 15/16**



31/3,K/42 (Item 42 from file: 350)  
DIALOG(R)File 350:Derwent WPIX  
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013642347 \*\*Image available\*\*  
WPI Acc No: 2001-126555/200114  
XRPX Acc No: N01-093344

Switching system for interconnecting number of computer user terminals has a number of computers where users can access any one or more of the computers from single terminal or user interface module  
Patent Assignee: CYBEX COMPUTER PROD CORP (CYBE-N); AVOCENT CORP (AVOC-N); AVOCENT INT LTD (AVOC-N); CYBEX COMPUTER PROD INT LTD (CYBE-N)

Inventor: AHERN S M; CURRAN J; EGAN C; LANGEJURGEN S; LISCHESKI A; MALINOWSKI K; PATZELT A; SZCZEPANEK A; WILLIAMS C H; LANGEJUERGEN S  
Number of Countries: 095 Number of Patents: 008

Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
IE 81150	B3	20000503	IE 99431	A	19990526	200114 B
EP 1075111	A1	20010207	EP 99203130	A	19990923	200114
US 6388658	B1	20020514	US 99452449	A	19991202	200239
CA 2327988	A1	20020608	CA 2327988	A	20001208	200254 N
WO 200261594	A1	20020808	WO 2000US42291	A	20001129	200262 N
EP 1075111	B1	20030416	EP 99203130	A	19990923	200328
DE 69906959	E	20030522	DE 606959	A	19990923	200341
			EP 99203130	A	19990923	
AU 2001243062	A1	20020812	WO 2000US42291	A	20001129	200427 N
			AU 2001243062	A	20001129	

Priority Applications (No Type Date): IE 99431 A 19990526; CA 2327988 A 20001208; WO 2000US42291 A 20001129; AU 2001243062 A 20001129

Patent Details:

Patent No	Kind	Lan Pg	Main IPC	Filing Notes
IE 81150	B3	39	G06F-013/00	
EP 1075111	A1 E		H04L-012/46	
			Designated States (Regional):	AL AT BE CH CY DE DK ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT RO SE SI
US 6388658	B1		G09G-005/00	
CA 2327988	A1 E		G06F-003/00	
WO 200261594	A1 E		G06F-013/40	
			Designated States (National):	AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CR CU CZ DE DK DM DZ EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT TZ UA UG UZ VN YU ZA ZW
			Designated States (Regional):	AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC MW MZ NL OA PT SD SE SL SZ TR TZ UG ZW
EP 1075111	B1 E		H04L-012/46	
			Designated States (Regional):	AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE
DE 69906959	E		H04L-012/46	Based on patent EP 1075111
AU 2001243062	A1		G06F-013/40	Based on patent WO 200261594

Switching system for interconnecting number of computer user terminals has a number of computers where users can access any one or more of the computers from single terminal or user interface module

Abstract (Basic):

... The switching hub (40) is a modular system which has a number of switch modules (41) and each of them has an analogue transmitter (43) circuit and/or an analogue receiver circuit (42), an analogue crosspoint switching arrangement, a programmable digital circuit (44) for handling digital data signals, digital crosspoint switching

arrangement, and a backplane (45) interface between the analogue (42,43) and digital (44) circuits.

... For interconnecting a number of **computer** user terminals, in a **computer** network...

...cursor control device or mouse (KVM) system with distributed control, i.e. without a master **CPU** , and in which all cards and components are hot-swappable, which allows for simple maintenance and updating of the system to interconnect more **workstations** and **computers** , without any system down time...

...The figure shows a schematic representation of a high end **KVM switching** system...

...128 **computers** (201-328...

... **Workstations** (1-16...

...User interface **module** (17

Title Terms: **SWITCH** ;

International Patent Class (Main): **G06F-003/00** ...

... **G06F-013/00** ...

... **G06F-013/40**

International Patent Class (Additional): **G06F-013/14** ...

Manual Codes (EPI/S-X): **T01-C02A** ...



US006388658B1

(12) **United States Patent**  
Ahern et al.

(10) Patent No.: **US 6,388,658 B1**  
(45) Date of Patent: **May 14, 2002**

(54) **HIGH-END KVM SWITCHING SYSTEM**

(56)

**References Cited**

(75) Inventors: **Steven M. Ahern; John Curran; Colm Egan**, all of Clare (IE); **Stefan Langejürgen**, Vlotho/Exter (DE); **Anton Lischewski**, Halle (DE); **Klaus Malinowski**, Essen (DE); **Andreas Patzelt**, Bunde (DE); **Andreas Szczepanek**, Bielefeld (DE); **Charles H. Williams**, Limerick (IE)

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(73) Assignee: **Cybex Computer Products Corp.**,  
Huntsville, AL (US)

*Primary Examiner*—Xiao Wu

(\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(74) *Attorney, Agent, or Firm*—Nixon & Vanderhye PC

(57)

**ABSTRACT**

The present invention relates to a switching system for interconnecting a plurality of computer user terminals or workstations each having user interface devices, including a keyboard, a video display unit, and a cursor control device or mouse (KVM), with a plurality of computers in a computer network, allowing a user to access any one or more of said computers from the user interface devices of a single terminal or workstation. It is denoted "high end" because of the potentially large number of computers which may be interconnected with the system.

(21) Appl. No.: **09/452,449**

(22) Filed: **Dec. 2, 1999**

(30) **Foreign Application Priority Data**

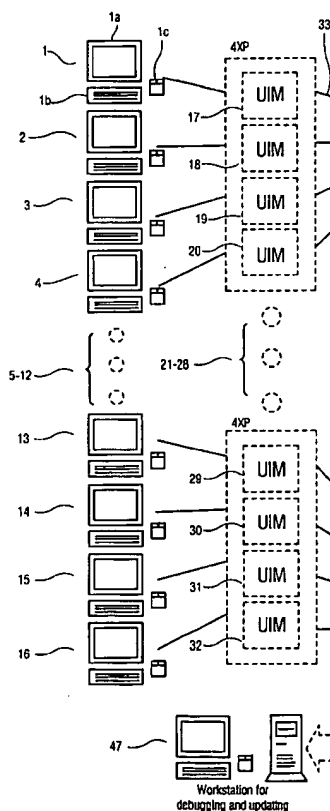
May 26, 1999 (IE) ..... S990431

(51) Int. Cl.<sup>7</sup> ..... **G09G 5/00**

(52) U.S. Cl. .... **345/168; 345/1.1**

(58) Field of Search ..... 345/168, 169,  
345/170, 171, 156, 157, 1.1, 1.2, 2.1, 2.2,  
2.3, 3.1, 3.2, 3.3, 3.4, 4, 5; 341/20, 22,  
23

**31 Claims, 12 Drawing Sheets**



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of the invention. Control signals from the digital card underneath are supplied to the analogue receiver PCB as serial data via the stacker connector. In order to minimize the coupling of conducted digital "noise" from the digital PCB to the analogue circuits all control signals are "galvanically isolated" using opto isolators. On the analogue side of the opto-isolated barrier this serial data stream is fed directly to the analogue crosspoint switches and determines the signal routing within the crosspoint switch. The selected active crosspoint output is buffered immediately by a wideband monolithic amplifier (511). This buffer directly drives a section of "stripline" similar to that described earlier. This stripline section carries the signal to the correctly terminated input stage of the "backplane analog bus" driver circuit (510) located close to the HDM plus daughtercard connector (503). This placement is necessary in order to keep the unterminated "stub" length short when the bus driver is disabled. The analogue transmitter card (42) is connected to the backplane analogue bus using a HDM plus daughtercard connector assembly, as described above.

In the present embodiment of the invention the analogue bus driver used is a MAX4223EUT-T device, supplied by Maxim. This device has an output disable function which is activated by "pulling" a shutdown control pin (SHDN) low (507).

Therefore a particular channel output is effectively "wire-OR'ed" with the same channel outputs on another receiver card or cards in the same chassis thereby giving each card's output access to the common backplane analogue bus. The control signals required to provide the enable/disable function are also derived from the serial data stream. This control information is extracted in a similar manner to that described for the differential input stages using a further two 8-bit shift registers and controls the analogue bus drivers directly.

While the invention has been particularly shown and described with reference to embodiments thereof, those skilled in the art will understand that the foregoing and other changes in form and detail may be made therein without departing from the spirit and scope of the present invention.

What is claimed is:

1. A switching system for interconnecting a plurality of computer user terminals, having user interface devices including a keyboard, a video display unit and a cursor control device, with a plurality of computers in a computer network, allowing a user to access any one or more of said computers from the user interface devices or a single terminal, comprising:

a switching hub for routing keyboard and cursor control signals transmitted from any one of the terminals to a selected computer, and for routing video signals received from the said computer to said one of the terminals, said signals being in both digital and analogue form,

a user interface module for receiving said transmitted keyboard and cursor control signals, coupled between said plurality of computer user terminals and said switching hub,

a computer interface module for receiving said received video signals, coupled between said plurality of computers and said switching hub,

wherein the physical architecture of the switching hub includes a modular system comprising a plurality of hot swappable switch modules, each module comprising an analogue transmitter circuit and/or an analogue receiver circuit, each including an analogue crosspoint switching arrangement, a programmable digital circuit for handling digital data signals and including a digital

14

crosspoint switching arrangement, and a backplane interface between the said analogue and digital circuits.

2. A switching system according to claim 1, in which the digital circuit of each switching module comprises its own central processing unit adapted to provide distributed control of each switch module in the switching system.

3. A switching system according to claim 1, in which the digital circuit is bi-directional and is adapted to handle received or transmitted digital data signals, and is common to all switch modules.

4. A switching system according to claim 1, in which each switch module is configured as either a transmitter module or a receiver module.

5. A switching system according to claim 1, wherein each switch module provides access to a pre-determined number of computer user terminals or computers.

6. A switching system according to claim 1, in which the horizontal synchronization (HS) and vertical synchronization (VS) parts of the video signal are digitally encoded and handled by said digital circuit.

7. A switching system according to claim 1, in which internal communication between the an analogue transmitter or receiver circuit and the digital circuit is via an internal system bus.

8. A switching system according to claim 7, wherein the internal system bus is a differential controller area network (CAN) bus.

9. A switching system according to claim 1, in which the analogue crosspoint switching arrangement comprises a switch topology based on a switched transconductance architecture.

10. A switching system according to claim 9, in which the analogue crosspoint switching arrangement comprises a low power, large matrix crosspoint switch with high input resistance, low input capacitance and wide bandwidth.

11. A switching system according to claim 10, in which the analogue crosspoint switching arrangement comprises a plurality of multiplexers, each comprising a folded-cascode high-speed voltage feedback amplifier.

12. A switching system according to claim 1, wherein the digital crosspoint switching arrangement comprises a field programmable gate array.

13. A switching system according to claim 12, wherein the digital crosspoint switch arrangement is controlled by the central processing unit on its switch module, via separate address, data and control buses.

14. A switching system according to claim 1, wherein communication between the digital crosspoint switch arrangement and the backplane is via a differential transceiver, preferably a low voltage differential driver/receiver.

15. A switching system according to claim 5, wherein each switch module can handle sixteen video channels, such that a minimum of eight switch modules will allow sixteen computer user terminals to access 128 computers in a non-blocking way.

16. A switching system according to claim 15, wherein the digital crosspoint switching arrangement comprises two bi-directional 16x16 gate arrays adapted simultaneously to handle respective HS and VS signal data, pertaining to one video channel.

17. A switching system according to claim 16, in which the analogue crosspoint switching arrangement comprises an array of 128 transconductance input stages organized as eight 16x1, or two 16x8, multiplexers with a common, 16-line analogue input bus.

18. A switching system according to claim 1, in which each multiplexer switching hub further comprises a pro-

31/3,K/27 (Item 27 from file: 350)  
DIALOG(R)File 350:Derwent WPIX  
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015682177 \*\*Image available\*\*  
WPI Acc No: 2003-744366/200370  
XRPX Acc No: N03-596138

**Video switch for Keyboard Video Mouse systems, has discrete radio frequency switch with control, video input and output and video output of one computer is connected to input of discrete switch**

Patent Assignee: KING R J (KING-I); VOLL P J (VOLL-I)

Inventor: KING R J; VOLL P J

Number of Countries: 001 Number of Patents: 001

Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
US 20030131127	A1	20030710	US 200238998	A	20020105	200370 B

Priority Applications (No Type Date): US 200238998 A 20020105

Patent Details:

Patent No	Kind	Lan Pg	Main IPC	Filing Notes
US 20030131127	A1	13	H04N-007/16	

**Video switch for Keyboard Video Mouse systems, has discrete radio frequency switch with control, video input and output and video output of one computer is connected to input of discrete switch**

Abstract (Basic):

... The **switch** has a voltage converter with a video select signal connected to its input. There is a discrete radio frequency **switch** (420), a depletion mode MOSFET device, with a control, video input and output. A video output of one of the **computers** is connected to the input of the discrete **switch** and the output of the voltage converter is connected to the control of the discrete **switch** .

... Used for Keyboard Video Mouse (KVM) systems to provide centralized and monitor of **multiple** of **computers** .

...

...The drawing shows a schematic representation of the radio frequency **switch** and a drive circuitry...

...Discrete radio frequency **switch** . (420

...Title Terms: **SWITCH** ;

International Patent Class (Additional): G06F-015/173



US 20030131127A1

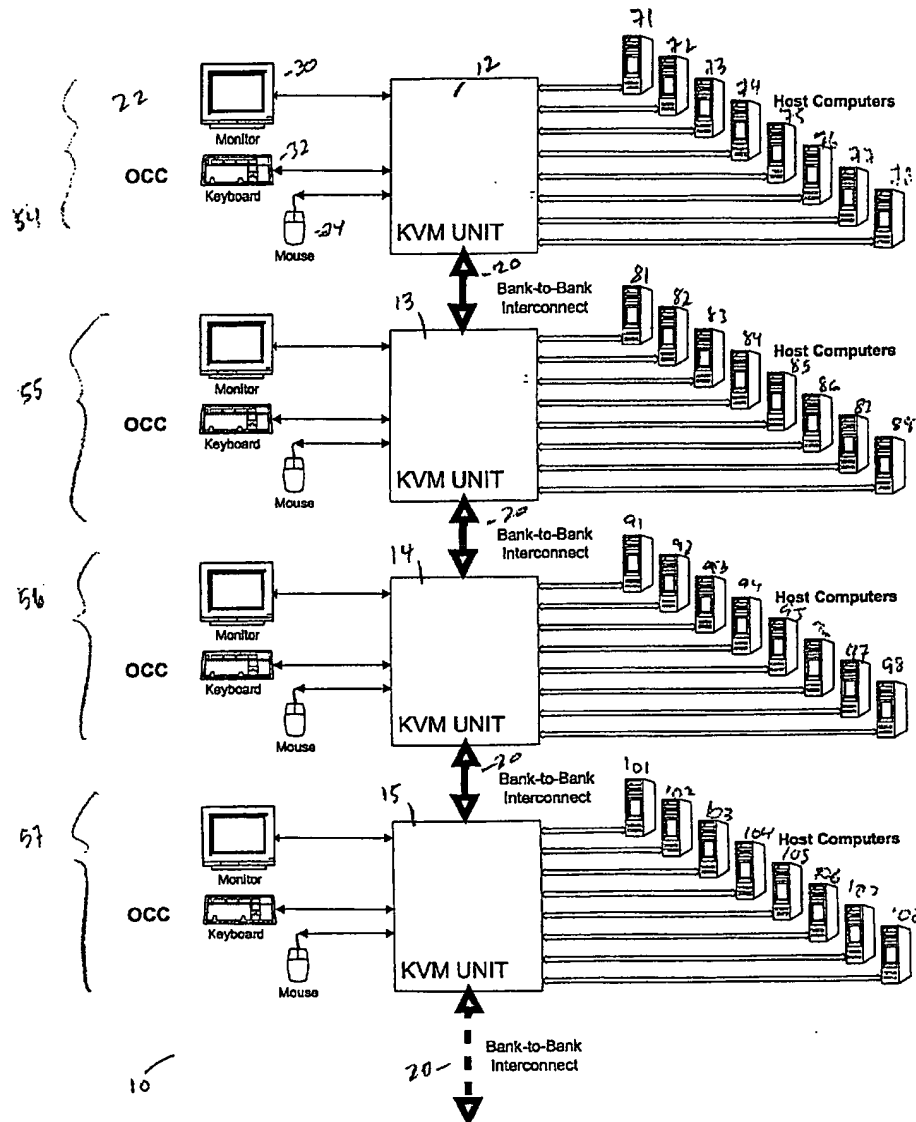
(19) **United States**(12) **Patent Application Publication** (10) Pub. No.: **US 2003/0131127 A1**  
King et al. (43) Pub. Date: **Jul. 10, 2003**(54) **KVM VIDEO & OSD SWITCH**

Publication Classification

(76) Inventors: **Randy J. King, Rochester, NY (US);**  
**Parker J. Voll, Rochester, NY (US)**(51) Int. Cl.<sup>7</sup> ..... **H04N 7/16; G06F 15/173**(52) U.S. Cl. .... **709/238; 725/143; 709/223**(57) **ABSTRACT**

A high speed video switch in a KVM system using discrete Radio Frequency (RF) switch circuits. The RF switch circuits are configured into a multiplexed circuit to route video signals from a selected host computer to a target monitor. Voltage converters are used to provide control signals of the proper voltage to the RF switch circuits. Peaking operational amplifiers are used to compensate for the roll-off effect caused by the video connectors. An On Screen Display (OSD) switch using the RF switches is used to rapidly switch between the OSD data and host computer video for display to the target operator control center monitor.

Correspondence Address:  
**BRYAN CAVE LLP**  
245 Park Ave.  
New York, NY 10167 (US)

(21) Appl. No.: **10/038,998**(22) Filed: **Jan. 5, 2002**

29/3,K/12 (Item 12 from file: 350)  
DIALOG(R)File 350:Derwent WPIX  
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014254492 \*\*Image available\*\*  
WPI Acc No: 2002-075192/200210  
XRPX Acc No: N02-055476

**Network-based** keyboard - video - mouse switching system in which  
information is retrieved from a workstation network addressed to a  
server assigned to the data converter

Patent Assignee: CYBEX COMPUTER PROD CORP (CYBE-N); AVOCENT CORP (AVOC-N);  
ANDERSON R L (ANDE-I); COLLINS J F (COLL-I); DESMARAIS M (DESM-I); GILGEN  
R L (GILG-I); PINKSTON W J (PINK-I); SCHULTZ S (SCHU-I); THOMAS C L  
(THOM-I)

Inventor: ANDERSON R L; COLLINS J; DESMARIS M; GILGEN R; PINKSTON W;  
SCHULTZ S; THOMAS C L; COLLINS J F; DESMARAIS M; GILGEN R L; PINKSTON W J  
; SCHULZ S

Number of Countries: 094 Number of Patents: 010

Patent Family:

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EP 1297408	A1	20030402	EP 2000944753	A	20000621	200325
			WO 2000US16972	A	20000621	
TW 522329	A	20030301	TW 2001110137	A	20010427	200365
JP 2003534685	W	20031118	WO 2000US16972	A	20000621	200401
			JP 2001580647	A	20000621	
US 6681250	B1	20040120	US 2000563434	A	20000503	200407
CN 1454340	A	20031105	CN 2000819618	A	20000621	200408
NZ 522395	A	20040528	NZ 522395	A	20000621	200437
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			RU 2002132254	A	20000621	

Priority Applications (No Type Date): US 2000563434 A 20000503; US  
2003640257 A 20030814

Patent Details:

Patent No	Kind	Lan Pg	Main IPC	Filing Notes
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WO 200184291	A1	E	32 G06F-003/00	
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Designated States (National): AE AL AM AT AU AZ BA BB BG BR BY BZ CA CH  
CN CR CU CZ DE DK DM EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG  
KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ PL PT RO RU  
SD SE SG SI SK SL TJ TM TR TT TZ UA UG UZ VN YU ZA ZW

Designated States (Regional): AT BE CH CY DE DK EA ES FI FR GB GH GM GR  
IE IT KE LS LU MC MW MZ NL OA PT SD SE SL SZ TZ UG ZW

AU 200058803	A			Based on patent WO 200184291
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EP 1297408	A1	E	G06F-003/00	Based on patent WO 200184291
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Designated States (Regional): AL AT BE CH CY DE DK ES FI FR GB GR IE IT  
LI LT LU LV MC MK NL PT RO SE SI

TW 522329	A		G06F-003/00	
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JP 2003534685	W	37	H04L-029/06	Based on patent WO 200184291
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US 6681250	B1		G06F-015/173	
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CN 1454340	A		G06F-003/00	
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NZ 522395	A		G06F-003/00	
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US 20050044184	A1		G06F-015/16	Based on patent WO 200184291
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Cont of application US 2000563434

Cont of patent US 6681250

RU 2249847	C2		G06F-013/00	Based on patent WO 200184291
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**Network-based** keyboard - video - mouse switching system in which

information is retrieved from a workstation network addressed to a

server assigned to the data converter

Abstract (Basic):

... A data converter (47) acts as an intermediary between the workstation (51) communicating via a maintenance network (20) to the motherboard (42) of the server (41). The converter can cause the motherboard to perform cold boots and other functions and receive raw video at the video port (45), while converting the video resolutions of the server to match the resolutions required to meet those required by the monitor at the workstation .

... INDEPENDENT CLAIMS are included for a keyboard - video - mouse converter and for a method of linking servers in a network...

...Network switching of computer peripheral data...

...The drawing is a block diagram of a server

...

... Workstation (51...

... Server (41...

... Motherboard (42

...Title Terms: SWITCH ;

International Patent Class (Main): G06F-003/00 ...

... G06F-013/00 ...

... G06F-015/16 ...

... G06F-015/173

Manual Codes (EPI/S-X): T01-C04D ...

... T01-F05B2



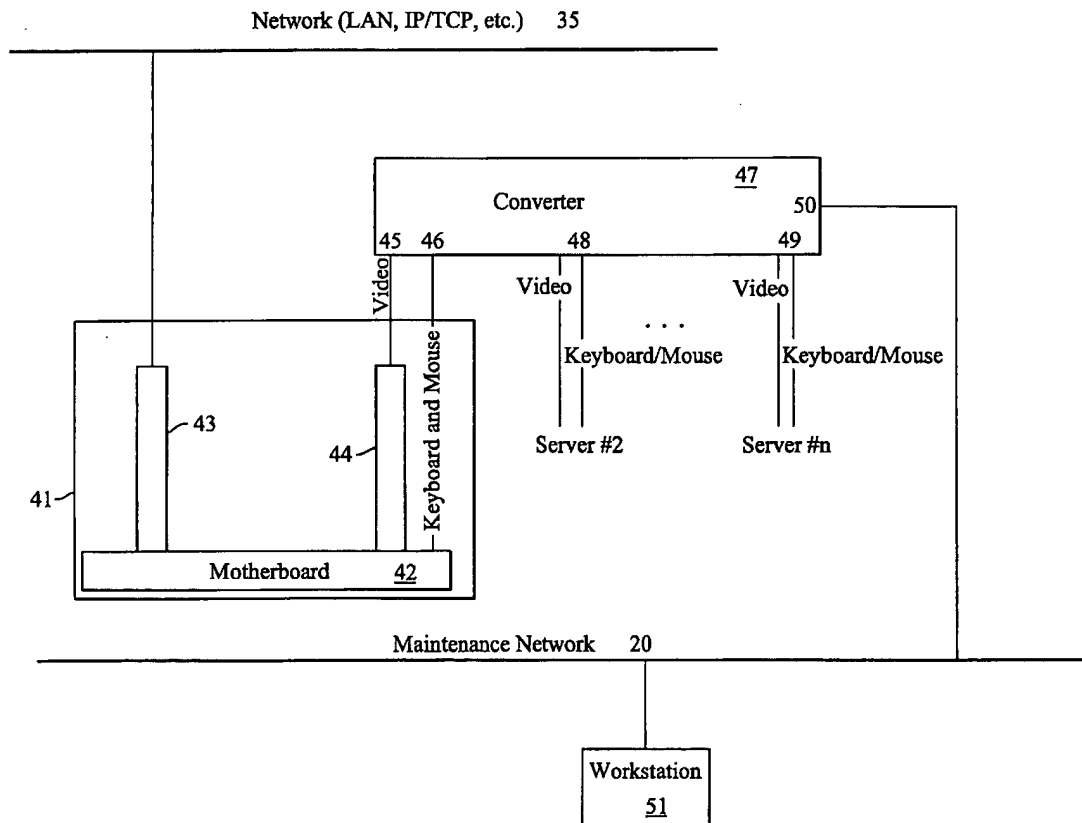
US 20050044184A1

(19) **United States**(12) **Patent Application Publication****Thomas et al.**(10) **Pub. No.: US 2005/0044184 A1**(43) **Pub. Date: Feb. 24, 2005**(54) **NETWORK BASED KVM SWITCHING SYSTEM****Related U.S. Application Data**

(63) Continuation of application No. 09/563,434, filed on May 3, 2000, now Pat. No. 6,681,250.

**Publication Classification**(51) **Int. Cl.<sup>7</sup>** ..... **G06F 15/16**(52) **U.S. Cl.** ..... **709/219; 709/208**(57) **ABSTRACT**

A keyboard/video/mouse (KVM) switching protocol is disclosed in which KVM information is applied to a network of workstations. At least one data converter communicates on the workstation network and retrieves KVM information from the workstation network that is addressed to a server assigned to the converter. The converter places the KVM information in a format suitable to the assigned server and applies the converted KVM information to the appropriate standard device ports of the server. The system provides motherboard access to the servers that is characteristics of KVM switches but provides essentially unlimited scalability not known in traditional KVM switches.

(76) **Inventors:** **Christopher L. Thomas**, Madison, AL (US); **Robin L. Anderson**, Winchester, TN (US); **Robert L. Gilgen**, Westford, MA (US); **Mark DesMarais**, Northboro, MA (US); **William J. Pinkston**, Fayetteville, TN (US); **Jamie F. Collins**, Huntsville, AL (US); **Stephan Schultz**, Bethesda, MD (US)**Correspondence Address:****Davidson Berquist****Klima & Jackson LLP****Suite 920****4501 North Fairfax Drive****Arlington, VA 22203 (US)**(21) **Appl. No.: 10/640,257**(22) **Filed: Aug. 14, 2003**

[0051] Next, the raw video is packeted at digital video packeting element 105. This digital packeting can be performed in accordance with U.S. patent Ser. No. 08/909,924 by O'Dryna et al., (filed Aug. 12, 1997) and Ser. No. 09/100,582 by O'Dryna et al. (filed Jun. 19, 1998), both commonly owned, both of which are incorporated herein by reference.

[0052] The keyboard and mouse signals come through on the K/M #1 line to converter port 102. As described previously, the keyboard and mouse connections provide direct access to the motherboard of the server. The keyboard and mouse port 102 connects to the keyboard mouse I/O 108 which condition signals to and from the server 11 keyboard and mouse ports. The keyboard and mouse signals then proceed to the keyboard mouse conversion element 107 where appropriate conversions are performed to ensure that the keyboard and mouse signals from the workstation and the server are consistent in format. Keyboard and mouse signals are packeted in element 106.

[0053] The converter 100 also includes elements communicating with the video I/O 103 and keyboard and mouse I/O 108 to answer command instructions provided by the server, for example at server boot-up. These instructions could include for example mouse protocols, keyboard standards, and monitor resolutions, etc.

[0054] Once the raw digital video is packeted at element 105 and the keyboard mouse signals are packeted at element 106, they are provided to the network card 109, which sends the packets onto the network 20, addressed to the appropriate workstation 25-27, etc.

[0055] Some elements of converter 100 have been omitted from FIG. 10 for purposes of brevity, but one can recognize that converter 100, to the extent not specifically shown in FIG. 10, otherwise operates in accordance with traditional KVM switches, such as are commercialized by Cybex as Autoview and xP series switches.

[0056] FIG. 8 illustrates an alternative embodiment of the present invention in which the corporate network 10 and maintenance network 20 have been combined into a single network 80. As can be seen in FIG. 8, the workstations 87 and 88 communicate with the network 80, as do servers 81, 83, and 85, to which the workstations may gain KVM control. When the servers 81, 83 and 85 communicate with each other over the network 80, they do so by addressing each other directly over the network 80. Workstations 87 and 88 can also communicate with the servers directly by addressing data to the server themselves. When, however, the workstations 87 and 88 need further control over the servers 81, the workstations address the converters 82, 84 and 86 and the converters in turn transfer the keyboard, video, and mouse information to the associated server directly to the motherboards 89, 90, and 91.

[0057] Thus, in FIG. 8, if workstation 87 needs to control server 83, the workstation 87 would address the converter 84 at IP address D by sending keyboard, video and mouse information from its own IP address G to the IP address D of converter 84. The embodiment of FIG. 8 assumes an Internet protocol type data structure on the network 81, but of course other data protocols may be substituted therefore. Once the workstation 87 sends KVM data to the converter 84, the converter 84, which has hardware connection to the

motherboard 90 of server 83 via the keyboard and mouse ports of the server 83, provides the keyboard and mouse information to the motherboard 90 and the video information to the video card of the server 83 (not shown).

[0058] A still further embodiment of the present invention is shown in FIG. 9 in which network 10 and maintenance network 20 have associated servers 93 and 94 with associated converters 95 and 96 communicating therebetween. Workstation 97 communicates on maintenance network 20 and controls servers 93 and 94 via the converters 95 and 96, as described in detail above. In the embodiment of FIG. 9, however, bridge 92 connects network 10 and maintenance network 20, thus effectively tying network 10 and network 20 into a common network structure. In FIG. 9, the maintenance network 20 remains independent of the network 10 and yet the workstation 97 can still access server 93 and server 94 directly via bridge 92. The embodiment of FIG. 9 also provides the advantage of allowing the workstation 97 to get direct motherboard access to the servers 93 and 94 via converters 95 and 96, without employing the bridge 92.

[0059] While the invention has been particularly shown and described with reference to embodiments thereof, those skilled in the art will understand that the foregoing and other changes in form and detail may be made therein without departing from the spirit and scope of the present invention.

1-41. (Canceled).

42. A converter for communicating data between a workstation and one server of a plurality of servers, the plurality of servers communicating with each other across a server network, the converter comprising:

a network interface facility communicatively coupling the converter to the workstation across a packet switched network; and

a communication link communicatively coupling the converter to the server, said communication link transmitting keyboard, video, cursor control data between the converter and the server.

43. A converter as in claim 42, wherein the server network and the packet switched network are the same network.

44. A converter as in claim 42, wherein the server network and the packet switched network are different networks.

45. A method of communicating data between a workstation and one server of a plurality of servers, the plurality of servers communicating with each other across a server network, the method comprising:

transmitting keyboard, video and cursor control data from the workstation across a packet switched network;

receiving the keyboard, video and cursor control data from the packet switched network; and

converting the keyboard, video and cursor control data into a format suitable for transmission to a keyboard port, a video port and a cursor control port of the server.

46. A method as in claim 45, wherein the server network and the packet switched network are the same network.

47. A method as in claim 45, wherein the server network and the packet switched network are different networks.

\* \* \* \* \*

29/3,K/3 (Item 3 from file: 350)  
DIALOG(R)File 350:Derwent WPIX  
(c) 2005 Thomson Derwent. All rts. reserv.

016587854 \*\*Image available\*\*  
WPI Acc No: 2004-746589/200473  
XRPX Acc No: N04-589789

**Modular information handling system for e.g. airline reservation, has keyboard , video , and mouse communication management card to connect with midplane of system and to manage communication with associated blade servers**

Patent Assignee: DELL PROD LP (DELL-N)  
Inventor: BOBBITT J M; MEI Z; NGUYEN D T; RAMSEY S M  
Number of Countries: 001 Number of Patents: 001  
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
US 20040199699	A1	20041007	US 2003407013	A	20030403	200473 B

Priority Applications (No Type Date): US 2003407013 A 20030403

Patent Details:

Patent No	Kind	Lan Pg	Main IPC	Filing Notes
US 20040199699	A1	7	G06F-013/14	

**Modular information handling system for e.g. airline reservation, has keyboard , video , and mouse communication management card to connect with midplane of system and to manage communication with associated blade servers**

Abstract (Basic):

... The system (10) has a **keyboard , video , and mouse ( KVM )** communication management card (18) to connect with a midplane (14) of the system and to manage communication with a number of associated **blade servers (12)**. A **KVM switching** controller in communication with a midplane connector manages the **KVM** communication with the **servers** . The controller is in communication with a VGA connector and two PS2 connectors.

... A) a stand alone **blade server** adapter system...

...B) a method of managing **keyboard , video and mouse ( KVM )** communication with a number of **blade servers** .

...The **blade server KVM** management card is able to communicate with **multiple blade servers** within a modular information handling system, which allows a user to conveniently access the **KVM** signals through a single interface. The system allows power, **KVM** , and communication signals to be provided to a **blade server** component without requiring the use of a midplane, thus allowing **individual blade servers** to be used as a stand alone system for testing purposes...

... **Blade servers (12...**

... **KVM** management card (18

Title Terms: **MODULE ;**

International Patent Class (Main): **G06F-013/14**

Manual Codes (EPI/S-X): **T01-C03A ...**

... **T01-C07C5**



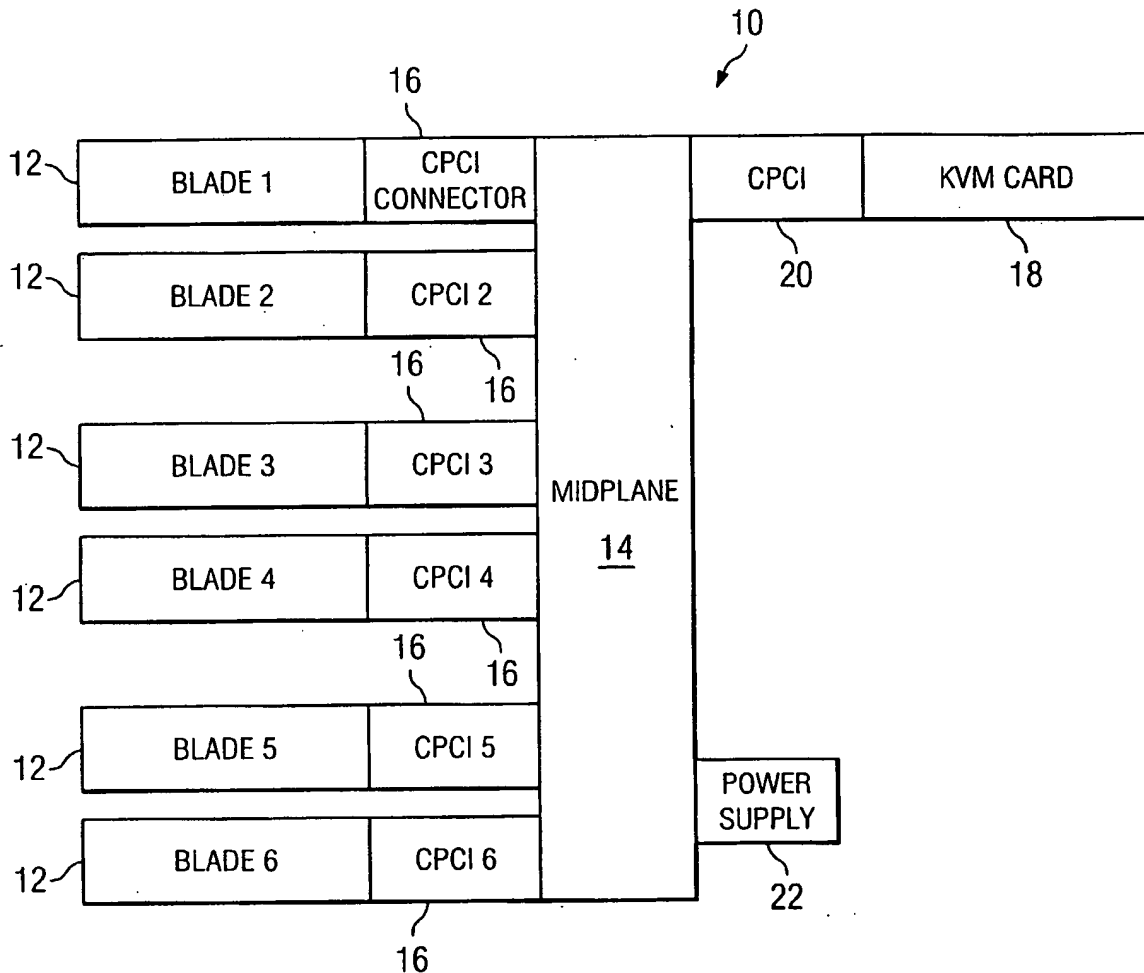
US 20040199699A1

(19) **United States**(12) **Patent Application Publication****Bobbitt et al.**(10) **Pub. No.: US 2004/0199699 A1**(43) **Pub. Date: Oct. 7, 2004**(54) **BLADE SERVER ADAPTER CARD**(22) Filed: **Apr. 3, 2003**(75) Inventors: **Jil M. Bobbitt**, Austin, TX (US); **Zhan Mei**, Round Rock, TX (US); **Dung T. Nguyen**, Round Rock, TX (US); **Scott M. Ramsey**, Austin, TX (US)**Publication Classification**(51) Int. Cl.<sup>7</sup> ..... **G06F 13/14**(52) U.S. Cl. .... **710/305**

Correspondence Address:

**BAKER BOTTS, LLP****910 LOUISIANA****HOUSTON, TX 77002-4995 (US)**(57) **ABSTRACT**

A modular information handling system includes a KVM management card. The KVM management card manages KVM communication with associated blade servers and allows access to KVM signals from each of the associated blade server through a VGA connector, a first PS2 connector and a second PS2 connector.

(73) Assignee: **DELL PRODUCTS L.P.**, Round Rock, TX(21) Appl. No.: **10/407,013**

29/3,K/8 (Item 8 from file: 350)  
DIALOG(R)File 350:Derwent WPIX  
(c) 2005 Thomson Derwent. All rts. reserv.

015668145 \*\*Image available\*\*  
WPI Acc No: 2003-730332/200369  
XRPX Acc No: N03-583732

Computer interface extension configuration has extension receiver coupled to user interface devices and extension transmitter card to receive and provide data transmissions from extension transmitter card to user interface devices

Patent Assignee: COMPAQ INFORMATION TECHNOLOGIES INC (COPQ )

Inventor: FERGUSON P L; STEVENS J C

Number of Countries: 001 Number of Patents: 001

Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
US 20030126323	A1	20030703	US 200135778	A	20011231	200369 B

Priority Applications (No Type Date): US 200135778 A 20011231

Patent Details:

Patent No	Kind	Lan Pg	Main IPC	Filing Notes
US 20030126323	A1	11	G06F-013/12	

Computer interface extension configuration has extension receiver coupled to user interface devices and extension transmitter card...

Abstract (Basic):

... 300) has an extension transmitter card disposed within a host and electrically coupled to the **motherboard** of the host through two connectors. An extension receiver is coupled to user interface devices

... the communications that occur in the first connector. The first connector of the host's **motherboard** allows **motherboard** signals to be shared internal to the host. The **separate** second connector of the host's **motherboard** supports communications with the host. INDEPENDENT CLAIMS are included for the following...

...a) the **computer** interface extension transmitter; and...

...b) the **computer** interface communication extension method between host **computer** and **several computer** interface devices...

...For integrating a **KVM** ( **keyboard** , **video** , **mouse** ) extension transmitter with a graphics controller on an add-in card...

...transmission to user interface devices. Includes extension transmitter card that can be electrically connected to **motherboard** of the host through PCI (peripheral connection interface), PCI-X or AGP (accelerated graphics port...

...The figure shows the block diagram of the **computer** interface extension solution in which a managing **switch** and multi-system **switches** are introduced into the solution...

... **Computer** interface extension configuration (300

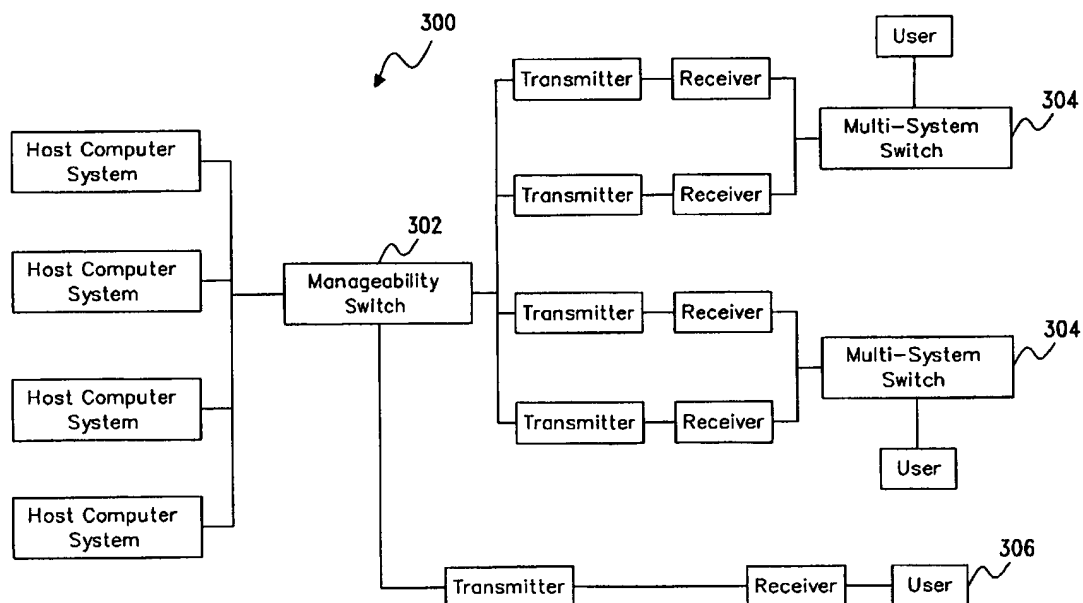
Title Terms: **COMPUTER** ;



US 20030126323A1

(19) **United States**(12) **Patent Application Publication**  
**Ferguson et al.**(10) **Pub. No.: US 2003/0126323 A1**(43) **Pub. Date: Jul. 3, 2003**(54) **SOLUTION FOR INTEGRATING A KVM  
EXTENSION TRANSMITTER WITH A  
GRAPHICS CONTROLLER ON AN ADD-IN  
CARD**(52) **U.S. Cl. .... 710/63**(75) **Inventors: Patrick L. Ferguson, Cypress, TX  
(US); Jeffrey C. Stevens, Spring, TX  
(US)****Correspondence Address:****AKIN, GUMP, STRAUSS, HAUER & FELD,  
LLP.****300 WEST 6TH STREET****SUITE 2100****AUSTIN, TX 78701 (US)**(73) **Assignee: Compaq Information Technologies  
Group, L.P., Houston, TX (US)**(21) **Appl. No.: 10/035,778**(22) **Filed: Dec. 31, 2001****Publication Classification**(51) **Int. Cl.<sup>7</sup> ..... G06F 13/12**(57) **ABSTRACT**

A computer interface extension configuration that includes a host having a motherboard, an extension transmitter card, and an extension receiver. The motherboard includes a first connector that allows motherboard signals to be shared internal to the host, and a second connector separate from the first connector that supports communications with the host. The extension transmitter card is positioned within the host and is electrically connected to the motherboard of the host via at least the first connector and the second connector. The extension transmitter card has a graphics controller that interfaces with the second connector independent from communications that occur on the first connector. The extension receiver is connected to a plurality of user interface devices and extensibly connected to the extension transmitter card. The extension receiver, among other things, receives data transmissions from the extension transmitter card of the host to thereby provide the data transmissions to one or more of the plurality of user interface devices.



31/3,K/19 (Item 19 from file: 350)  
DIALOG(R)File 350:Derwent WPIX  
(c) 2005 Thomson Derwent. All rts. reserv.

016031771 \*\*Image available\*\*  
WPI Acc No: 2004-189622/200418  
XRPX Acc No: N04-150392

**Built-in keyboard - video - mouse switch for computer , has connector provided in opening of fixing support coupled to one side of card, such that logic control unit arranged on card processes signal received from connector**

Patent Assignee: POWER COMMUNICATION TECH CO LTD (POWE-N)

Inventor: LI H

Number of Countries: 001 Number of Patents: 001

Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
US 6672896	B1	20040106	US 2003342244	A	20030115	200418 B

Priority Applications (No Type Date): US 2003342244 A 20030115

Patent Details:

Patent No	Kind	Lan Pg	Main IPC	Filing Notes
US 6672896	B1	8	H01R-011/00	

**Built-in keyboard - video - mouse switch for computer , has connector provided in opening of fixing support coupled to one side of card, such**

Abstract (Basic):

... The **switch** has a L-shaped fixing support (2) with an opening, which is coupled to one...

... Built-in **keyboard - video - mouse switch** for computer .  
...

...The **switch** is fixedly coupled to an augmentation socket in the host, and hence the space is...

...The figure shows a schematic view of the built-in **keyboard - video - mouse switch** .

...Title Terms: **SWITCH** ;

Manual Codes (EPI/S-X): **T01-C02** ...



US006672896B1

(12) **United States Patent**  
**Li**(10) **Patent No.:** **US 6,672,896 B1**  
(45) **Date of Patent:** **Jan. 6, 2004**(54) **BUILT-IN KVM SWITCH**(75) **Inventor:** **How-Chin Li, Taipei (TW)**(73) **Assignee:** **Power Communication Tech. Co., Ltd., Taipei (TW)**(\*) **Notice:** Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.(21) **Appl. No.:** **10/342,244**(22) **Filed:** **Jan. 15, 2003**(51) **Int. Cl.<sup>7</sup>** ..... **H01R 11/00**(52) **U.S. Cl.** ..... **439/502**(58) **Field of Search** ..... 439/498, 502,  
439/505; 710/38; 345/163(56) **References Cited****U.S. PATENT DOCUMENTS**

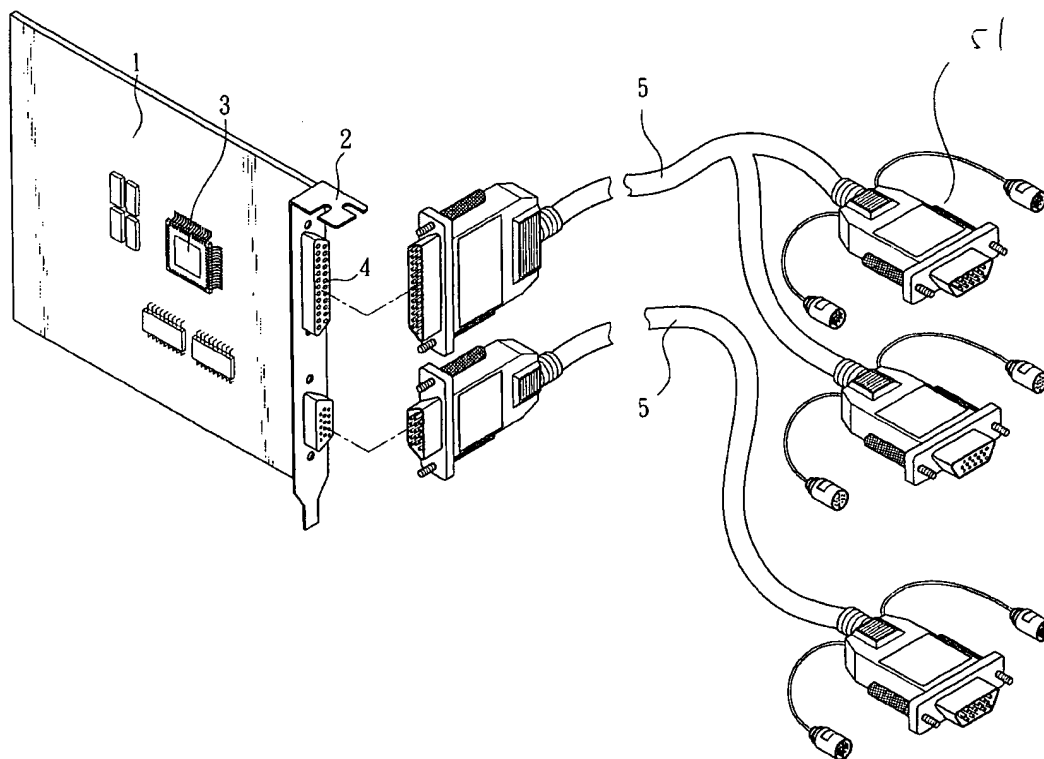
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6,615,272 B1	*	9/2003	Ambrose	709/238

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*Primary Examiner*—Ross Gushi(74) *Attorney, Agent, or Firm*—Troxell Law Office PLLC(57) **ABSTRACT**

A built-in KVM switch: comprising: a card; a fixing support, fixedly coupled to one side of the card and having at least one opening, inserted into an augmentation socket in a host; at least one connector, disposed in the opening on the fixing support; at least one connecting wire corresponding to the connector connected to the connecting wire at one end; and a logic control unit, disposed on the card so as to process a signal from the connector.

**7 Claims, 5 Drawing Sheets**

31/3,K/21 (Item 21 from file: 350)  
DIALOG(R)File 350:Derwent WPIX  
(c) 2005 Thomson Derwent. All rts. reserv.

015974280 \*\*Image available\*\*  
WPI Acc No: 2004-132121/200413  
XRPX Acc No: N04-105504

**Data transfer method of keyboard - video - mouse switch , involves transferring peripheral data to data pin at each input/output port connected to respective computer , corresponding to set transmit flag**

Patent Assignee: LIU C K (LIUC-I)

Inventor: LIU C K

Number of Countries: 001 Number of Patents: 001

Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
US 20040015615	A1	20040122	US 99425187	A	19991025	200413 B
			US 2003618652	A	20030715	

Priority Applications (No Type Date): US 2003618652 A 20030715; US 99425187 A 19991025

Patent Details:

Patent No Kind Lan Pg Main IPC Filing Notes

US 20040015615 A1 14 G06F-003/00 CIP of application US 99425187

**Data transfer method of keyboard - video - mouse switch , involves transferring peripheral data to data pin at each input/output port connected to respective computer , corresponding to set transmit flag**

Abstract (Basic):

... data register corresponding to each of the input/output (I/O) ports connected to respective **computer** ready for receiving. A transmit flag is set corresponding to each port, and a bit...  
... For transferring data from input devices e.g. mouse and keyboard to **several computers** using **keyboard - video - mouse ( KVM ) switch .**  
...

...Simultaneously transfers data between **several computers** and input devices, by using simple process within a clock cycle. The data transferring time...

...The figure shows a circuit diagram of the main **processor** of the **KVM switch .**

...Title Terms: **SWITCH ;**

International Patent Class (Main): **G06F-003/00**

Manual Codes (EPI/S-X): **T01-C02 ...**

... **T01-C07C4**



US 20040015615A1

(19) **United States**(12) **Patent Application Publication**  
**Liu**(10) Pub. No.: **US 2004/0015615 A1**(43) Pub. Date: **Jan. 22, 2004**(54) **METHOD FOR PERFORMING DATA  
TRANSFER OF KVM SWITCH**

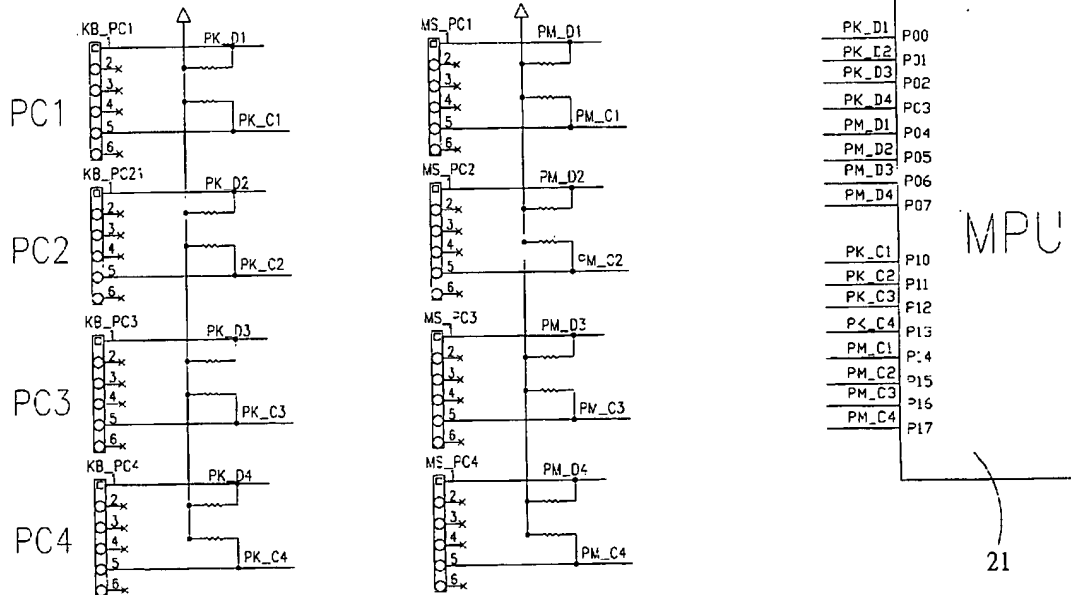
(52) U.S. Cl. .... 710/1

(76) Inventor: **Cheng Kuo Liu, Taipei (TW)**(57) **ABSTRACT**

Correspondence Address:

**ROSENBERG, KLEIN & LEE**  
**3458 ELLICOTT CENTER DRIVE-SUITE 101**  
**ELLICOTT CITY, MD 21043 (US)**(21) Appl. No.: **10/618,652**(22) Filed: **Jul. 15, 2003****Related U.S. Application Data**(63) Continuation-in-part of application No. 09/425,187,  
filed on Oct. 25, 1999, now abandoned.**Publication Classification**(51) Int. Cl.<sup>7</sup> ..... **G06F 3/00**

A method for performing data transfer of keyboard-video-mouse (KVM) switch, especially referring to a method that can make the KVM switch transmit data to or receive data from multiple computers simultaneously. The method includes steps as: storing peripheral data ready for transfer in data registers; setting transmit flag register (Tx flag) and receive flag register; transferring (Rx flag) a bit of the peripheral data from each of the data registers to each of the data pins during a clock cycle at each of the I/O ports corresponding to the Tx flag set; receiving a bit of control data from each of the data pin and storing the bit of said control data to each of the data register during the clock cycle at each of the I/O ports corresponding to the Rx flag set. Thereby, the method can transmit data to or receive data from multiple computers simultaneously.



[0055] Step 81: In the beginning, the controller 211 of the main processor 21 will read the clock and data pin of each computer.

[0056] Step 82: Then, it will check if any computer is ready for transmitting data.

[0057] In practice, the controller 211 will check the data pins and clock pins of the computers 10 to find out which one is ready for transmitting data. If the voltages of the data pin and clock pin of a computer are 0V and 5V respectively, then the computer will be identified as a ready one.

[0058] Step 83: If there is a computer ready for transmitting data, then the controller 211 will set its corresponding Rx flag=1. Otherwise, set the corresponding Rx flag register=0.

[0059] Step 84: Then, the controller 211 will set the voltage of the clock pins of the computers 10 to 0V, if their corresponding Rx flag=1.

[0060] Step 85: The controller 211 will maintain the voltage of the clock pins of the computers 10 for a unit time if their corresponding Rx flag=1, then set it to 5V.

[0061] Step 86: Then, the controller 211 will read the signals of the data pins of the computers 10 if their corresponding Rx flag=1, then it will store the signals to corresponding data registers 213.

[0062] Step 87: The controller 211 will maintain the voltage of the clock pins of the computers 10 for a unit time, if their corresponding Rx flag=1.

[0063] Step 88: return to step 84 and performs to complete 11 clock periods.

[0064] Step 89: Then, the controller 211 will select 8 bits data from each of the data registers 213 as received data if their corresponding Rx flag=1.

[0065] FIG. 9 shows the flowchart for simultaneously receiving and sending data.

[0066] Step 91 In the beginning, the controller 211 of the main processor 21 will read the clock and data pin of each computer.

[0067] Step 92: It will check if any computer is ready for transmitting data.

[0068] Step 93: And, it will check if any computer is ready for receiving data.

[0069] Step 94: Then, the controller 211 will check if any data is ready for transmitting.

[0070] Step 95: It stores the ready data in corresponding data registers 213, respectively.

[0071] Step 96: If there is a computer ready for receiving data and its corresponding data register 213 has data ready to send, then the controller 211 will set the corresponding Tx flag=1. Otherwise, set the corresponding Tx flag register=0.

[0072] Step 97: If there is a computer ready for transmitting data, then the controller 211 will set its corresponding Rx flag=1. Otherwise, set the corresponding Rx flag register=0.

[0073] Step 98: Then, the controller 211 will set the voltage of the data pins and clock pins of the computers 10 to 0V and 5V respectively, if their corresponding Tx flag=1 or Rx flag=1.

[0074] Step 99: The controller 211 will maintain the voltage of the clock pins of the computers 10 for a unit time, if their corresponding Tx flag=1 or Rx flag=1.

[0075] Step 100: Then, the controller 211 will set the voltage of the clock pins of the computers 10 to 5V, if their corresponding Tx flag=1.

[0076] Step 101: The controller 211 will send the ready data to the computers 10 with their Tx flag=1, respectively.

[0077] Step 102: The controller 211 will read the signals of the data pins of the computers 10 with their Rx flag=1 and then it will store the signals to corresponding data registers 213.

[0078] Step 103: Maintain the voltage of the clock pins at 5V for a unit time.

[0079] Step 104: Return to step 99 and perform to complete 111 clock periods.

[0080] Step 105: Then, the controller 211 will select 8 bits data from each of the data registers 213 as received data if their corresponding Rx flag=1.

[0081] Step 106: Finish the transmission and reception of the computers 10 with their corresponding Tx flag=1 and Rx flag=1.

[0082] To sum up, the present invention provides a method for performing data transfer of KVM switch. It can simultaneously perform data transfer between multiple computers and input devices. And can shorten the transferring time of data transfer. Further, it can perform data transfer to multiple computers within a clock cycle. More particularly, the present invention uses less circuit to perform data transfer to multiple computers in a far more efficient manner.

[0083] Although the present invention has been described with reference to the preferred embodiment thereof, it will be understood that the invention is not limited to the details thereof. Various substitutions and modifications have suggested in the foregoing description, and other will occur to those of ordinary skill in the art. For example, the MPU can be replaced by ASIC (application specific integrated circuit), EPLD (electrically programmer device) or CPLD (complex programmable logic device). Therefore, all such substitutions and modifications are intended to be embraced within the scope of the invention as defined in the appended claims.

#### I claim

1. A method for performing data transfer of a keyboard-video-mouse (KVM) switch, the KVM switch having a main processor with a plurality of input/output (I/O) ports each connecting to a corresponding computer, each of the I/O ports corresponding to a transmit flag register (Tx flag) and a data register and having a data pin, the method comprising following steps:

- (a) storing peripheral data in the data register corresponding to each of the I/O ports for which said peripheral data is ready for transfer;
- (b) setting the Tx flag corresponding to each of the I/O ports connecting to the corresponding computer ready

for receiving said peripheral data and having said peripheral data ready for transfer;

(c) at each of the I/O ports corresponding to the Tx flag set, transferring a bit of said peripheral data from the data register thereof to the data pin thereof during a clock cycle; and

(d) repeating step (c) until reaching a predetermined number of times.

2. The method as claimed in claim 1, wherein each of the I/O ports has a clock pin, and the method further comprising:

checking the data pin and clock pin of each of the I/O ports to find out the computer ready for receiving said peripheral data.

3. A method for performing data transfer of a KVM switch, the KVM switch having a main processor with a plurality of I/O ports each connecting to a corresponding computer, each of the I/O ports corresponding to a receive flag register (Rx flag) and a data register and having a data pin, the method comprising following steps:

(a) setting the Rx flag corresponding to each of the I/O ports connecting to the corresponding computer ready for sending control data;

(b) at each of the I/O ports corresponding to the Rx flag set, receiving a bit of said control data from the data pin thereof and storing the bit of said control data to the data register thereof during a clock cycle; and

(c) repeating step (b) until reaching a predetermined number of times.

4. The method as claimed in claim 3, wherein each of the I/O ports has a clock pin, and the method further comprising:

checking the data pin and clock pin of each of the I/O ports to find out the computer ready for sending said control data.

5. A method for performing data transfer of a KVM switch, the KVM switch having a main processor with a plurality of input/output (I/O) ports each connecting to a

corresponding computer, each of the I/O ports corresponding to a Tx flag, a Rx flag and a data register and having a data pin, the method comprising following steps:

(a) storing peripheral data in the data register corresponding to each of the I/O ports for which said peripheral data is ready for transfer;

(b) setting the Tx flag corresponding to each of the I/O ports connecting to the corresponding computer ready for receiving said peripheral data and having said peripheral data ready for transfer;

(c) setting the Rx flag corresponding to each of the I/O ports connecting to the corresponding computer ready for sending control data;

(d) at each of the I/O ports corresponding to the Tx flag set, transferring a bit of said peripheral data from the data register thereof to the data pin thereof during a clock cycle;

(e) at each of the I/O ports corresponding to the Rx flag set, receiving a bit of said control data from the data pin thereof and storing the bit of said control data to the data register thereof during the clock cycle; and

(f) repeating step (d) and (e) until reaching a predetermined number of times.

6. The method as claimed in claim 5, wherein each of the I/O ports has a clock pin, and the method further comprising:

checking the data pin and clock pin of each of the I/O ports to find out the computer ready for receiving said peripheral data.

7. The method as claimed in claim 5, wherein each of the I/O ports has a clock pin, and the method further comprising:

checking the data pin and clock pin of each of the I/O ports to find out the computer ready for sending said control data.

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29/3,K/2 (Item 2 from file: 350)  
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Keyboard video monitor function control system for server blade system, includes KVM module in each blade acting as relay agent when external KVM controller is coupled to serve blade chassis and as master when KVM controller is not coupled

Patent Assignee: BOBBITT J M (BOBB-I); RAMSEY S (RAMS-I); DELL PROD LP (DELL-N)

Inventor: BOBBITT J M; RAMSEY S

Number of Countries: 001 Number of Patents: 002

Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
US 20040215617	A1	20041028	US 2003423277	A	20030425	200479 B
US 6915362	B2	20050705	US 2003423277	A	20030425	200544

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US 20040215617	A1	11	G06F-007/00	
US 6915362	B2		G06F-013/10	

Keyboard video monitor function control system for server blade system, includes KVM module in each blade acting as relay agent when external KVM controller is coupled to serve blade chassis and as master when KVM controller is not coupled

Abstract (Basic):

... The server blades have management module with integrated keyboard video monitor ( KVM ) module which detects whether the external KVM controller is coupled to server blade chassis. The integrated KVM module functions as a relay agent between the KVM controller and the server blade chassis, if external KVM controller is coupled to the chassis, else the integrated KVM module functions as a master.

... 2) method of controlling keyboard video monitor functions within server blade .

...

...For external control of keyboard video monitor ( KVM )/ mouse functions in network information handling system (claimed) e.g. server blade system used in airline reservations, financial transaction processing, enterprise data storage, global communication, etc...

...There is no need for additional hardware or software on each blade to implement the external KVM feature...

...The figure shows a block diagram of a server blade platform

Technology Focus:

... The serial port used by the server management blade is RS232 port. The digital communication path of the microcontroller in the management module is RS485, RS232 paths.

...Title Terms: BLADE ;

International Patent Class (Main): G06F-007/00 ...

... G06F-013/10

International Patent Class (Additional): G06F-013/14 ...

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... G06F-013/42

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